JUNE, 1951

Traffic Engineering

Traffic Engineering Improvements On A Few Streets in Fresno, California

- Putting Traffic Engineering to Work in Fresno
- Reducing Accidents of City-Owned Fleets
- The Conservation of Impact in Automobile Collisions
- Ten Traits of City Councilmen
- Efficiency of Four-Way-Stop Control at Urban Intersections

Official Publication of the Institute of Traffic Engineers

PARK-O-METER

protects

Your reputation

You hold your position of trust because the people of your community have confidence in your judgment. They depend on you to conserve public funds wisely . . . to obtain full value for every dollar. Your reputation is safe when you select *Park-O-Meter* as basic equipment in your parking system. Your judgment is confirmed by the experience of more than 700 American cities that have chosen Park-O-Meter to regulate traffic and provide revenue from both on-street and off-street parking locations.

convenience of fully automatic, one-hand operation . . . wins favor of users

dependability of *"honest-measure"* timer and tamper-proof coin mechanism . . . gains public support, minimizes servicing, protects parking revenues

convertibility at no cost and quickly to various time and coin settings . . . meets changing needs without obsoleting your equipment

visibility of *violation* signal at 50-yard range . . . makes enforcement easier

engineering based on 15 years of experience . . . brings you more than just a meter—*a complete metered parking system*

Maintain the reputation you enjoy . . . Ask us for the complete Park-O-Meter story before your city installs ANY type of parking meters.

PARK-O-METER COMPANY

stimsonite

TRADE-MARK ®

REFLECTORS

SIGN OF SAFETY ON THE HIGHWAY

A'G'A

TRADE-MARK

AMERICAN GAS ACCUMULATOR COMPANY

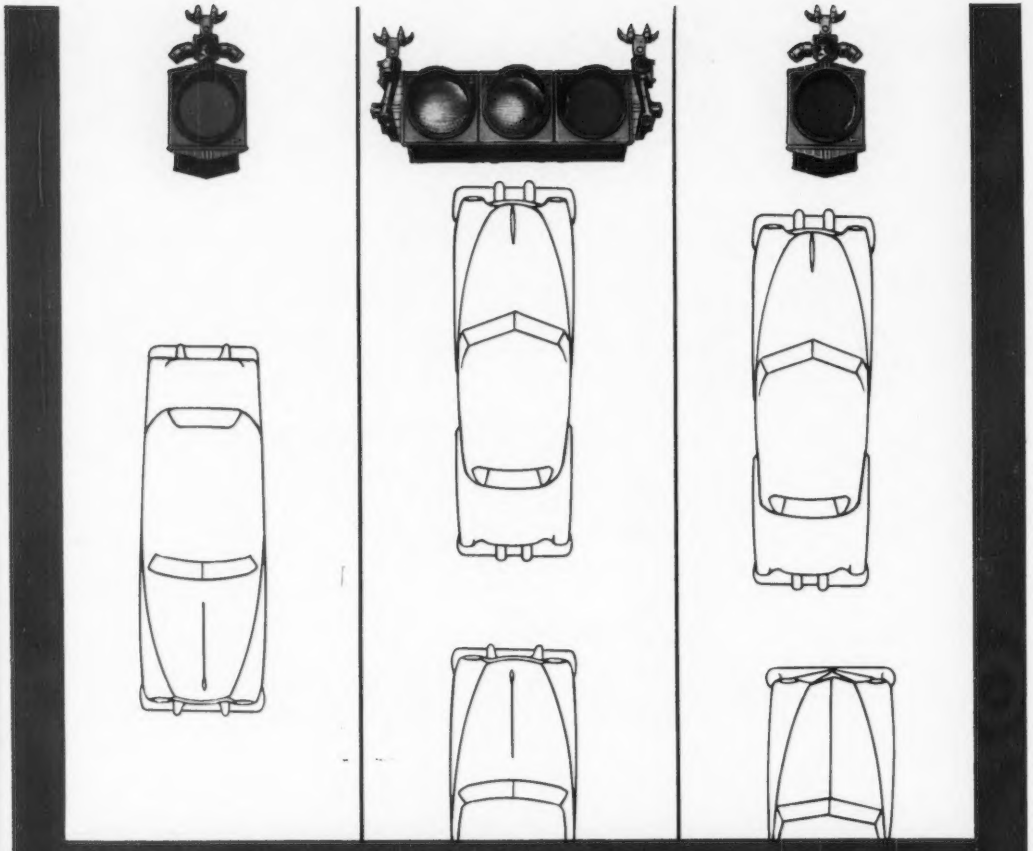
1027 NEWARK AVENUE, ELIZABETH 3, NEW JERSEY

A'G'A AIRPORT LIGHTING

A'G'A AGASTAT TIME DELAY RELAY

A'G'A STIMSONITE REFLECTORS

A'G'A MARINE LIGHTING EQUIPMENT



CROUSE-HINDS Lane Direction Signals

increase rush-hour roadway capacity as much as 100%

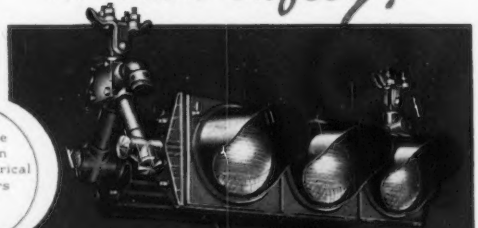
Roadways which were adequate to handle the traffic volume of ten years ago are now overloaded with a heavy traffic flow in one direction during certain hours. At other times the direction of heaviest flow may be reversed.

Crouse-Hinds Lane Direction Traffic Signals and Controllers have been developed to relieve this type of congestion . . . with safety!

They are two-way units suspended above each lane at mid-block locations, controlling the direction of traffic in all lanes of a street or highway. The signals display a green indication facing the traffic movement while the opposite faces display a red indication. The direction of traffic in any lane can easily be changed by reversing the signal indications. In this way, a majority of traffic lanes can be used in the direction of the heaviest movement, thus greatly increasing the capacity of the roadway. When the peak load has passed, the center lanes can be returned to their normal function as passing lanes by displaying an amber indication on both faces of such signals.

Write for additional information.

... with safety!



CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco Seattle — St. Louis — Washington. *Resident Representatives:* Albany Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. CROUSE-HINDS COMPANY OF CANADA, LTD., TORONTO, ONT.

A Nationwide Distribution Through Electrical Wholesalers

TRAFFIC SIGNALS · CONDULETS · FLOODLIGHTS · AIRPORT LIGHTING

Traffic Engineering

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

VOLUME XXI | JUNE, 1951 | NUMBER 9

COVER: Channelization and pavement marking on Fresno Street at the approach to the Southern Pacific underpass improvement. See article by Dier. *Photos by Edwin Schober*

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

INSTITUTE OFFICERS

HARRY E. NEAL
President

NATHAN CHERNIACK
Vice-President

F. B. CRANDALL
Vice-President

HARRY PORTER JR.
Secretary-Treasurer

PUBLICATION STAFF

FRED W. HURD
Editor

ANN S. LINCOLN
Managing Editor

Associate Technical Editors
ROBERT S. HOLMES, EDMUND R. RICKER
MARTIN C. STARK

Associate Editors
H. A. BARNES, J. A. CARROTHERS, C. C. CLARK, ARTHUR C. GIBSON, R. H. HARLESTON JR., C. S. LECRAW JR., EUGENE MAIER, S. T. SIEGEL, MARGARET WOOLVERTON

May We Offer . . .

Putting Traffic Engineering to Work in Fresno 295
Robert D. Dier

Traffic Trends 297

Reducing Accidents of City-Owned Fleets 298
J. A. Carrothers

The Consideration of Impact in Automobile Collisions 299
Edward F. Dudek Jr.

Ten Traits of City Councilmen 302
Arthur W. Bromage

Efficiency of Four-Way-Stop Control at Urban Intersections 305
J. Marshall Keneipp

Open Discussion 307
Paul W. Rice and C. E. Riggs

Reference Notes 308
Oregon State Highway Department

Traffic News 310

Looking Ahead 320

Index to Advertisers ..... **Inside Back Cover**

Published Monthly by the

Institute of Traffic Engineers

PUBLICATION office:
Interstate Printing Corp.
400 Watchung Avenue
Plainfield, New Jersey

EDITORIAL AND ADVERTISING offices:
Strathcona Hall
New Haven 11, Connecticut

Entered as second-class matter November 7, 1941, at the Post Office at Plainfield, New Jersey, under Act of March 3, 1879. ¶Single copies 40 cents, subscription price $3.50 per year in the United States; $2.00 per year to members. Other publications of the **Institute of Traffic Engineers** include Annual Proceedings, Traffic Engineering Handbook and Technical Bulletins. **¶The Institute is not responsible for any statements made or opinions expressed in its publications.** Permission to reprint contents with customary credit line is given unless otherwise stated.

Dual installation, Vineland, N. J.

Vineland approves

WHEREVER Duals are installed, you'll find satisfied "customers"—both municipal officials *and* motorists. For Duals give the kind of dependable service that gets everyone's approval.

In Vineland, New Jersey, for example, 500 Duals were installed in 1950. Maintenance is practically nil. And more motorists get a share of available parking space.

Duals have more advantages. They're ruggedly built to serve for years—in any weather. They operate automatically. And with Dual *gearshift* meters, parking control is flexible; a mere shift of a gear—on-the-spot—permits conversions to be made to meet changing conditions.

If your community plans to install or modernize metered parking facilities, find out how Duals can do a better job. Send for Bulletin DU-504 for on-street parking; Bulletin DU-505 for off-street parking.

THE DUAL PARKING METER COMPANY

A subsidiary of The Union Metal Manufacturing Company

Canton 2, Ohio

0 10 20 30 40 50 60
INSERT COIN
1 HOUR
1 TO 5 PENNIES OR 1 NICKEL
9 A.M. TO 6 P.M.
SUNDAYS AND HOLIDAYS EXCEPTED
555
Eventually you'll pay for the best
Get the best NOW . . .
GET DUAL AUTOMATICS!

Frankly Speaking

EFFICIENT and economical transportation of people and goods cannot be attained as long as we have "too many motor vehicles in too little space." Although public officials have continued to improve street and highway facilities and, within financial limitations, have constructed new facilities to meet the ever-increasing demands for space in which to move and park motor vehicles, we are lagging far behind in our efforts to balance supply against demands. Restrictions in the use of existing facilities are not popular with motorists, because they affect "custom and habit," but they are essential if traffic congestion and traffic accidents are to be reduced.

There is no substitute for "voluntary compliance" with traffic and parking regulations. If motorists are properly informed in advance regarding the reasons for establishment of restrictive regulations and if their cooperation is solicited in making the regulations effective, police enforcement may be minimized. Many traffic engineers in the past have spent too much time diagnosing traffic and parking problems, developing plans for traffic control regulations, and installing traffic control signs, signals and markings and have devoted too little time in selling their plans to the public, to public officials and to special interests. Traffic engineers should consider the broader aspects of the problem of transporting persons and goods and should spend more time in activities designed to raise the standards of the traffic engineering profession.

Most traffic engineers have the "know how" needed to solve traffic and parking problems. It is unfortunate that those engineers who are assigned responsibilities for traffic and parking control are not delegated with sufficient authority to produce traffic improvements through a traffic engineering approach. Motor vehicle movements may be facilitated and better provision may be made for adequate and acceptable parking places if traffic engineers are given the opportunity to establish essential regulations and to install traffic control devices where warranted. If officials responsible for the design and construction of new streets, highways and parking facilities will heed the advice of traffic engineers, motorists may expect more adequate and safer facilities for moving and storing their motor vehicles in the future.

It is up to individual traffic engineers to promote better public and professional relations, within the areas in which they work, if the traffic engineering profession is to attain proper recognition. Traffic engineers should be respected as consultants and advisors in the specialized field of traffic control rather than as mechanics who are only capable of installing traffic control devices.

Thos. E. Stelzer

Director

JOE PRISMO...

AT BAT!

JOE PRISMO bats 1.000 every time he comes up. No matter how tricky the light beam or the speed of its delivery, he returns it with interest!

Prismo's a big leaguer with lots of shine, not just a flash in the pan. He's really there to stay!

Prismo's superiority depends upon perfect teamwork: crystal clear Prismo spheres held in a bulldog grip by a great plastic Prismo binder. This combination is the result of the technical know-how that engineers have long experienced in the field of reflective coatings.

Prismo's great staying power and simple speedy method of application mean real savings in your budget.

Write today for fully informative bulletins on the many uses of Prismo, the sphere of safety.

PRISMO SAFETY CORPORATION
HUNTINGDON, PENNA.

Putting Traffic Engineering to Work in Fresno

By Robert D. Dier (Mem., ITE)
Traffic Engineer, City of Fresno, California

This article was presented as a paper of the recent annual street and highway conference of the Institute of Transportation and Traffic Engineering at Berkeley, California. It is the first of a series to be published in "Traffic Engineering." Articles of a similar nature written by traffic engineers of cities of various sizes in several parts of the country will appear in future issues of "Traffic Engineering" magazine. The population of Fresno is 90,700.

APPROXIMATELY five years ago the long neglected traffic problem caught up with the rapidly growing City of Fresno to the extent that the National Safety Council was called in to make a preliminary study of traffic conditions and corrective needs. In January of 1946, Harry Porter Jr., Traffic Engineer of the Safety Council, submitted a report recommending, among other things, the employment of a full time traffic engineer to guide the traffic engineering program of the City. In March of 1947, the City Commission authorized the Commissioner of Public Works to employ a traffic engineer on a one-year contract. Was this short contract an indication of another instance where the city officials of a city under 100,000 population were uncertain as to the permanent need of a traffic engineer or that the traffic problem could be solved in one year's time?

Organization

During the first few years of the program, an organization was gradually developed. Today, traffic engineering functions are divided and coordinated between three sub departments of the Department of Public Works, such as follows:

Traffic Engineering Division

Administration

The traffic engineer is responsible directly to the Commissioner of Public Works but is also under the jurisdiction of the City Engineer on all matters pertaining to major traffic control improvements. A separate office is provided for the traffic engineer, staffed with a secretary and part-time draftsman shared with the City Electrical Engineer. Funds are provided in the budget for the employment of additional personnel for traffic surveys when needed. This office processes all complaints, requests, and the many other assignments which develop. Accident location files, accident spot maps, and records are maintained.

Traffic Painting

This function is under the supervision of the traffic engineer. A painter in charge and four helpers are employed full time on this work. A well-equipped paint shop, sign shop, three trucks, two striping machines, paint spray equipment, stencils, and other necessary equipment are furnished. During the wet weather periods when outside painting is impractical, the paint crew is assigned to sign maintenance and fabrication work in the sign shop.

Parking Meter Maintenance

This work is under the supervision of the traffic engineer. Two full time experienced parking meter maintenance men are employed. A well-equipped maintenance shop and two three-wheeled motorcycles are provided for the maintenance of approximately 1700 parking meters.

Electrical Engineering Department

Traffic Signal Installation and Maintenance

This function is under the supervision of the City Electrical Engineer, the traffic engineer cooperating on design, specifications, and field inspection work. A part-time supervisor and a full time traffic signalman are employed. A well-equipped signal maintenance shop and service truck is available for this work.

Street Lighting Installation and Maintenance

Street lighting work is under the supervision of the City Electrical Engineer with the traffic engineer cooperating on studies and recommendations. One part-time supervisor, two electricians, and four helpers are employed on all street lighting work. Well-equipped service trucks with high extension ladders capable of servicing the high mounted luminaires are provided.

Street Maintenance Department

Traffic Sign Installation and Maintenance

This phase of the work is under the supervision of the Superintendent of Streets with the traffic engineer cooperating in making studies and recommendations on sign installation work. One part-time supervisor and two full time sign men are employed. A well-equipped service truck is provided.

Traffic Island Construction

Special traffic island construction projects are under the supervision of the superintendent of streets with the traffic engineer cooperating by furnishing the necessary design and construction inspection. Maintenance personnel and equipment are drafted for this type of work.

Budget

Most important of all factors influencing the success of any traffic engineering program is an adequate budget with which to accomplish the many improvements needed in any city. Beginning with little or no budget the first year of the program, the traffic engineering program has since enjoyed a generous annual budget authorized by a progressive and far-sighted City Commission. The traffic engineering budget has gradually localized in the Traffic Engineering Division during the past few years. By the end of this

Street lighting improvement on Broadway.

fiscal year a total of approximately $1,364,000 will have been spent on traffic engineering improvements out of city funds since the year 1946. The past three years alone have averaged $274,000 annual expenditures. The 1950 to 1951 budget provides funds in the amount of $487,000 for traffic engineering improvements of all types. The continued support for an adequate working budget by the City Commission is evidence that it recognizes the importance of traffic engineering in city government.

In any rapidly expanding city such as the City of Fresno, there is a great demand for all available monies to apply towards the seemingly ever increasing essential services and improvements that usually go with rapid growth. Unless a new service, such as the traffic engineering program, can prove its worth to the city fathers and the taxpayers, partial or complete cessation of funds and support can logically be expected. The continued support of the traffic engineering program in the City of Fresno is due to a large extent to the many services and accomplishments performed through the close cooperation of the various divisions under the Department of Public Works. Considerable credit must also be given to the California Division of Highways, who through their district office, have provided a fine type of cooperation towards assisting the City of Fresno with its problems and making many fine improvements possible.

Activities

The many traffic engineering activities of the past four years will be discussed only briefly. These are as follows:

1. A comprehensive arterial street system was planned to guide our improvement program.

2. The arterial system is now approximately 100% protected by stop signs.

3. The arterial system is almost 100% center lined, and a considerable length of the streets is lane-lined where warranted.

4. The entire central business district has been provided with standard traffic signal installations. Most outlying major arterial intersections have received signal treatment where warranted.

5. Traffic signal systems have been designed to provide the best progressive movement possible for traffic. The signal system in the central business district is completely interconnected, also some of the outlying signal systems, to provide a more consistent service.

6. Numerous traffic islands have been constructed to channelize traffic movements and provide pedestrian protection.

7. A parking survey was made by the traffic engineer in the central business district. A consulting engineering firm was employed to bring this original survey up to date and make recommendations for a definite program. A valuation survey has been made on recommended sites for off-street parking, and action is now being taken towards the purchase of these sites.

8. The City of Fresno has cooperated with the Public Utilities Commission in making a hazard study of railroad grade crossings. In a follow-up installation program the city provided almost 100% sign and marking protection for these grade crossings.

9. The traffic engineer made studies in connection with a proposed railroad consolidation plan which will eventually eliminate congestion and hazard at numerous grade crossings.

10. The City of Fresno has cooperated with the California Division of Highways on major widening projects, underpass improvements, a free-way, and resurfacing projects.

11. Studies were made and a comprehensive plan for one-way streets was developed. The engineering program received its first real set-back when this one-way plan failed to receive Commission approval by a 3-2 vote. Continued action towards obtaining this approval will be taken at the earliest opportune time.

12. Continuous studies are maintained covering the traffic accident experience at intersections through the use of collision diagrams which number 300 intersections to date.

13. Each year a view obstruction survey is made at all stop sign and signal locations and is always followed up with a tree trimming and bush removal program by the City Parks Department.

14. A truck route plan was developed for through trucking on State highways and was approved by the California Division of Highways. The U. S. 99 section of this plan has been completely signed.

15. Studies have been made of hazard at school crossings. Marked crosswalks, advance pavement markings, and school signs have been provided at all schools.

16. The traffic engineer processes hundreds of complaints, requests, and other services. Speaking engagements, radio broadcasts, and contacts with the press are used to inform the public of the progress and purpose of the traffic engineering program.

17. City wide traffic counts are made and traffic flow maps are prepared for planning purposes.

18. The traffic engineer initiated action towards the organization of a traffic coordinating committee and a city-county safety council in cooperation with the Governor's Coordinating Committee and the National Safety Council. A report is in the hands of the mayor, and early action is expected on this program.

19. The traffic engineer is now participating in the Civil Defense Program for the City of Fresno.

20. Of all the activities of the Traffic Engineering Division of Fresno, the development of a modern traffic

ordinance is considered one of the most important. There is a great need for all cities throughout the nation to bring their traffic ordinances up to uniformity and eliminate much of the confusion now existing in traffic regulations.

Until recently, the City of Fresno was in the same position as many other cities throughout the nation and State as far as uniformity of traffic ordinances was concerned.

The Fresno ordinance grew like Topsy and in a piecemeal fashion. It contained obsolete, impractical, and illegal regulations which were confusing to both the public and the enforcement agency. For example, one section in the ordinance made it illegal for a motorist to enter a signalized intersection at any time on a yellow light, a direct conflict with the California Vehicle Code. Innocent motorists were being cited and were paying fines on acts which were legal under the Vehicle Code. Something had to be done to correct these conditions.

Approximately two years ago the traffic engineer started work towards bringing the local traffic ordinance up to uniformity. The many existing traffic ordinances from the city clerk's office were studied and compared with the Vehicle Code and the uniform traffic ordinance of the League of California Cities. Gradually a semblance of order developed as obsolete, illegal, and impractical ordinances were discarded under the guidance of the uniform ordinance. The first draft of the new ordinance was submitted to members of the City Commission, the Police Department, traffic judges, the city attorney, and to interested organizations for comment. Eventually all differences of opinion were eliminated, and in December of 1950 the City Commission unanimously approved the new ordinance.

Accomplishments

The effectiveness and scope of the traffic engineering program may be illustrated, in a general way by the ratings received in the past few years in the National Traffic Safety Contest conducted by the National Safety Council. In 1946, the City of Fresno ranked 57th in the nation among cities of between 50,000 and 100,000 population, in traffic engineering achievement as based on performance standards of leading cities reporting in the contest. In the next three years, Fresno advanced to within 0.6 of a point of the first place position actually won by Evanston, Illinois, long noted for its traffic safety activities. For achievements in traffic engineering in 1950 the Institute of Traffic Engineers awarded a first place plaque to Fresno for her efforts. This record speaks for itself.

Intersection re-design at Divisadero Street.

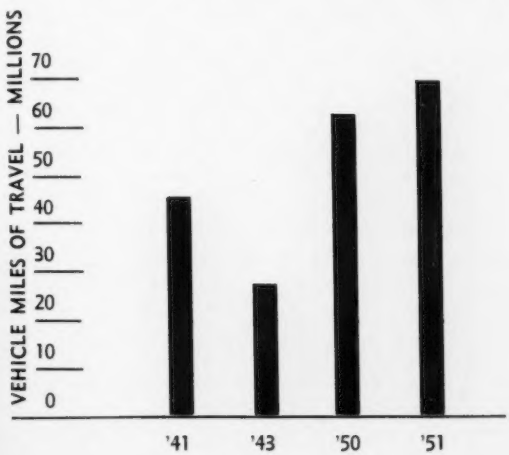
City officials in municipalities under 100,000 population who are still doubtful of the need for traffic engineering services in their communities should review the Report of the Committee on Engineering of the President's Highway Safety Conference. In this report 101 of the leading traffic safety authorities in the nation have assembled their views on what cities can gain from traffic engineering and what they should do to cooperate in the nationwide drive to solve the traffic problem. In the Recommended Action Program section of this report is found the following quoted paragraphs which should be of interest to cities under 100,000 population:

"There is a particular need to impress legislators and administrators with the fact that engineering standards cannot be translated into highway safety unless adequate funds and suitable engineering personnel are made available."

"It is recommended that there be established in cities having between 50,000 and 100,000 population at least one full time traffic engineer vested with sufficient authority to insure the adoption of appropriate engineering measures for traffic operation and safety."

The experience of the City of Fresno without doubt has proven the soundness of the recommendations of the President's Highway Safety Conference for cities between 50,000 and 100,000 population. What Fresno has done other cities can do providing a traffic engineering program is backed by an adequate engineering set up, a generous budget, and plenty of public support; all of which are so essential to an effective program.

Traffic Trends



TRAVEL ON RURAL ROADS FOR FIRST FOUR MONTHS of 1941, 1943, 1950 and 1951.

Based on Bureau of Public Roads Data

Reducing Accidents of City-Owned Fleets

By J. A. Carrothers (Assoc. Mem., ITE)
City Traffic Engineer, Schenectady, N. Y.

THE insurance costs for the liability coverage on the fleet of city-owned vehicles in Schenectady is low in comparison with other cities. This favorable insuring rate is a result of a vigorous accident prevention program for the benefit of those who operate city-owned equipment.

At the spearhead of the City Administration's attack on accidents is the *Accident Review Board*, a committee of department heads directly concerned with the safety and operation of the city fleet. On the Accident Review Board are the City Manager, Corporation Counsel, Personnel Director, Chief of Police, a representative of the local insurance agency, a representative of the insurance carrier, and the City Traffic Engineer. The Board meets quarterly.

The operations of the Accident Review Board have been guided by the Traffic Engineer who acts as Secretary. The Board's safety program, in operation since 1946, should prove successful in any city where the Traffic Engineer's office would be willing to accept the additional responsibility.

The work of the Accident Review Board is of three types: (a) Punitive; (b) Incentive; (c) Educational.

Incentive, Punitive, Educational

Early in 1950 an "award" program was designed to furnish a positive incentive for driving safety. A limited number of "half days off with pay" were assigned to each city bureau for assignment to a selected group of those drivers having accident-free records. At six-month intervals all the accident-free drivers are given safe driving cards, and at the end of the year the accident-free drivers are given safe driving pins. At this writing there are nearly 200 accident-free drivers. This incentive plan has been accepted because it is made clear that the safe driving cards constitute a record which will help employees obtain positions more easily in the event they leave city employment.

As a part of an educational program the Board has sponsored the following measures:

1—Bi-monthly drivers' meetings with safety films.
2—Installation of safety messages on dashboards of all vehicles.
3—Distribution of posters.
4—Daily vehicle inspection reports.
5—Physical examination for drivers being hired and all drivers who have had accidents.

The strength of the Board stems largely from its ability to remove city employees from their jobs involving the driving of a motor vehicle when it is determined that the employee's accident experience is abnormal. Under this punitive work of the Board four drivers were removed from their jobs in the first six months of 1950. "Warning letters" were sent to seven more drivers.

Traffic Engineer's Responsibilities

Included in the Traffic Engineer's responsibility in the city's safety program are the following:

1—Receipt of all accident reports involving city equipment.
2—Forwarding copies of the accident report to the State and the insurance company.
3—Maintaining an accident record file by driver's name, showing Board rating as "preventable" or "not at fault."
4—Selection of drivers having repeated accidents and recommending their transfer from driving.
5—Selection of half-days off on the basis of mileage and type of operation.
6—Arranging for all driver meetings and the quarterly meetings of the Accident Review Board.
7—Preparation of formal minutes of the Board's meetings.
8—Interpreting accident summaries furnished by insurance carrier.

The amount of time actually spent by the Traffic Engineer in his work as Secretary of the Board is not as extensive as the above outline would indicate. Personnel of the local insurance agency and the safety engineering section of the insurance company furnish a considerable amount of assistance in developing the overall program and in the many detailed tasks which accompany each meeting or new proposal to increase safety.

Insurance Help Important

One of the basic functions of the Accident Review Board is deciding which accidents should be considered as "preventable" or "unavoidable" insofar as the driver's record is concerned. In this instance the insurance claim investigations are of particular value. In practically all cases, after a brief review of the circumstances, the Board's decision follows the decision of the driver's "guilt" as shown by the claim investigation.

The major part of the work of distributing the safety messages for dashboards and bulletins, as well as the preparation of the safe driving cards is performed by the insurance company's representatives. Accident Summaries, classified by type of "unsafe act" and furnished monthly by the insurance company accident prevention, are of value in "aiming" safety information in a selective manner.

Accidents Reduced

The work of the Accident Review Board is proving worth the time and effort. In 1950 all but two months (with extremely heavy snow conditions) have shown less accidents than 1949. During the months of October and November of 1950 only one accident was reported by the insurance carrier as "preventable."

The Consideration of Impact in Automobile Collisions

By Edward F. Dudek Jr.

Instructor, Department of Engineering Mechanics, University of Nebraska

THE basic impulse-momentum relations are applicable in the calculation of speeds that vehicles were traveling prior to a collision. Because these equations seem rather complex, they apparently have not been employed.

Since it has been customary in the courts to establish minimum speeds of the vehicles involved in a collision, another method has been presented in several traffic publications. Herein, it will be referred to as the energy method. A minimum initial speed of one vehicle is established by neglecting the energy lost in impact. However, if the energy method is used as explained in these publications, an error is introduced which is not in favor of the driver. The impulse-momentum relations will be used here to point out this error.

The Energy Method

The energy method will be reviewed briefly. Assume that two vehicles collide as shown in Fig. 1, where vehicles A & B skid the distance from their impact to the position of rest. The kinetic energy of A may be lost in several ways:

a. Energy lost by crushing of vehicles in impact.
b. Energy lost by moving vehicle B sideways.
c. Energy lost in skidding by vehicle A.

Vehicle A may lose its initial energy in other ways, such as movement up an incline, but only the three listed above will be considered here.

It has been suggested that the work equation

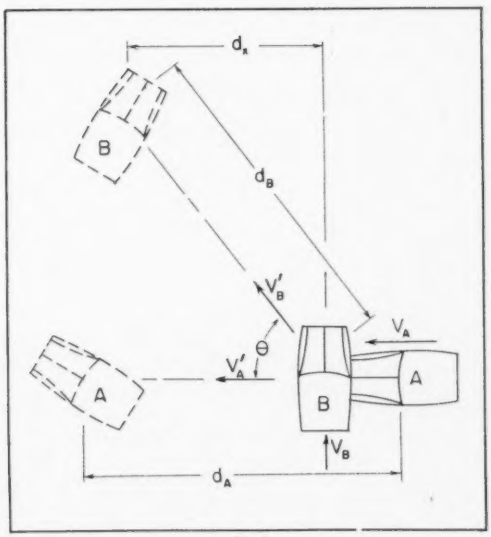


Fig. 1

LIST OF FORMULAE

	EQUATION NUMBER
$\frac{W_A V_A^2}{2g} = WK_a + (W_B f)dx + (W_A f)d_A$	1
$\frac{W_A V_A^2}{2g} = (W_B f)dx + (W_A f)d_A$	2
$Ft = \frac{W_A}{g}(V_A - V'_A)$	3
$Ft = \frac{W_B}{g}(V'_B \cos\theta)$	4
$\frac{W_A}{g}(V_A - V'_A) = \frac{W_B}{g}(V'_B \cos\theta)$	5
$\frac{W_A V_A}{g} = \frac{W_A V'_A}{g} + \frac{W_B(V'_B \cos\theta)}{g}$	6
$V_B = (V'_B \sin\theta)$	7
$C = \frac{(V'_B \cos\theta) - V'_A}{V_A}$	8
DISPLACEMENT FOR EACH VEHICLE $= \frac{V^2}{2fg}$	9

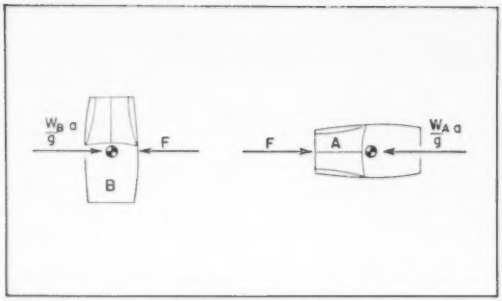
DEFINITIONS:

W_A, W_B	= WEIGHT OF VEHICLES A AND B
V_A, V_B	= VELOCITIES OF A AND B IMMEDIATELY BEFORE IMPACT
V'_A, V'_B	= VELOCITIES OF A AND B IMMEDIATELY AFTER IMPACT
dx	= DISTANCE THAT VEHICLE B IS MOVED SIDEWAYS
θ	= ANGLE BETWEEN DIRECTIONS OF VELOCITIES V_A AND V'_B
f	= COEFFICIENT OF FRICTION BETWEEN TIRES AND ROADWAY
g	= ACCELERATION OF GRAVITY
d_A, d_B	= DISTANCES VEHICLES A AND B SKID AFTER IMPACT
a	= LINEAR ACCELERATION OF VEHICLE A DURING IMPACT
F	= NORMAL FORCE OF IMPACT
t	= TIME INTERVAL OF IMPACT

Fig. 2

No. 1, in Fig. 2, would give the probable speed of vehicle A before impact. The terms on the right side of the equation represent the losses a, b and c of the initial energy of vehicle A. Since it is difficult to determine the amount of energy lost in deformation, the first term can be omitted and equation No. 1 becomes equation No. 2 (Fig. 2).

In a court case involving such a collision, the jurors are told that the probable speed of vehicle A was higher than the results obtained from equation No. 2 because photographs of the damaged vehicles will show that some energy was lost during impact. The basis for consideration in this method is that energy, a fundamentally scalar quantity, has been used incorrectly as a vector quantity. In making the determination, the energy lost during impact is neglected, and the other energy values are combined algebraically (as scalar quantities) thus contradicting the original assumption that energy would be considered a vector quantity. It is hard to say just what has actually been determined by using this method. Since it is based on a premise which contradicts the fundamental physical laws and then proceeds through a contradiction of that premise, the final result is necessarily inaccurate.



The Impulse-Momentum Method

For convenience, only a direct broadside collision will be considered here. That is to say, the resultant force of impact acts through the centers of gravity of the two vehicles and the velocities of approach of the two vehicles are at right angles.

Considering vehicles A & B, in Fig. 1, the normal force of impact will act on the vehicles as shown in Fig. 3. Since the normal force of impact F is not constant, then the linear acceleration, a, varies during the interval of impact. This leads to equation No. 3 which is the basic impulse-momentum expression where the linear normal impulse (Ft) is equal to the change in linear momentum during impact.

Similarly, for vehicle B, the linear normal impulse (Ft) is stated by equation No. 4. Since linear impulse and momentum are vector quantities and only the velocity components in the direction of the line of action of the impulses are taken into account, the velocity of vehicle B in that direction before impact is zero.

The normal force of impact acts on each vehicle during the same time interval (t). Thus, equations Nos. 3 and 4 may be equated to obtain equation No. 5. Equation No. 5 states that the momentum gained by vehicle B is equal to the loss of momentum of vehicle A during impact. Equation No. 5 may be written as equation No. 6 which states that the linear momentum before impact is equal to the linear momentum after impact in the direction of the line of action of the linear impulses. Equation No. 6 is also applicable for eccentric impact.

During impact, only the forces of impact are considered since other forces acting on the vehicle would be relatively small.

Velocity Components Perpendicular To the Normal Linear Impulses

To further simplify the problem, the frictional forces between the vehicles may be neglected. By making this assumption, the velocity components perpendicular to the normal linear impulses will remain unchanged during impact. Thus, the velocity component for vehicle B along the line of its path before collision is expressed by equation No. 7. This equation can also be used in an eccentric impact. The velocity components of vehicle B are clearly shown in Fig. 4.

Neglecting friction between the vehicles during impact is a reasonable assumption in many cases. The frictional force tends to rotate vehicle A, but usually this force is not of sufficient magnitude to change the direction of motion of vehicle A at the time of impact. Due to damage, however, vehicle A will usually change its direction of motion sometime after the impact. If the frictional force itself does change A's direction or if the vehicles are locked after impact, a momentum equation in place of equation No. 7 may be used in the direction of this frictional force.

It should be recognized that the theoretical velocity of vehicle B, immediately before impact, obtained from No. 7 will be somewhat lower than the actual velocity.

Law of Recovery

The changes in velocities during impact are affected by the resilience of the automobiles, and the Law of Recovery takes this into account. This brings forth another basic relation which includes the coefficient of restitution.

The coefficient of restitution c is defined as the difference in the velocities of separation divided by the difference in the velocities of approach in direction of the line of action of the normal linear impulses. For the special case of the direct broadside collision, it can be expressed as equation No. 8. This equation takes on a somewhat different form for eccentric impact.

For elastic bodies, such as glass or ivory, c approaches unity. As an example, assume that body B is not moving prior to impact and is hit squarely by body A traveling at 10 mph. If the bodies are of equal weights, body B would move on with a velocity of 10 mph after impact and A would stop. This may be exemplified by the impact of marbles or billiard balls where very little energy is absorbed during impact.

For inelastic or plastic bodies, such as clay or lead, c aproaches zero. If c is equal to zero, the velocities of both bodies are the same after impact, regardless of their weights. This means that after impact the bodies have equal velocity components in the direction of the line of action of the two impulses. For this condition, the maximum amount of energy is lost during impact, keeping in mind that the momentum equation must be satisfied regardless of the numerical value of c.

After studying a number of head-on and broadside collisions, it is believed that the coefficient of restitution between automobiles is nearly zero, except at very low speeds.

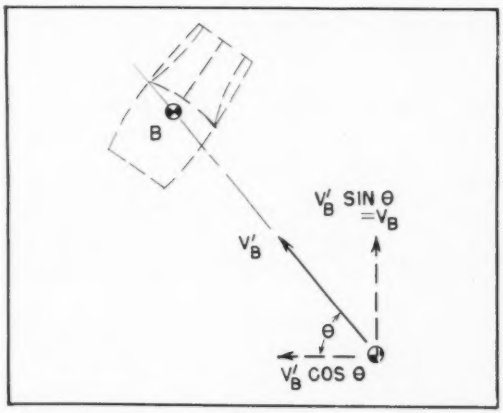


Fig. 4

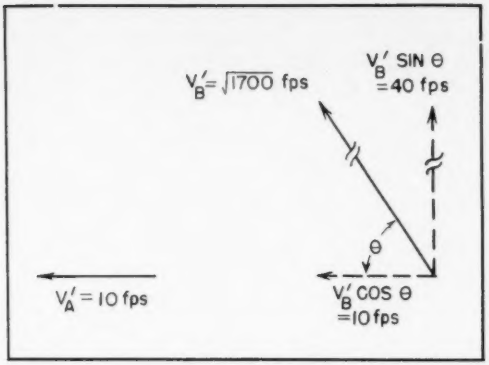


Fig. 5

Numerical Example

Assume that two vehicles, A and B, traveling at 20 ft. per sec. and 40 ft. per sec., respectively, collide as shown in Fig. 1. Since the coefficient of resistitution between automobiles is nearly zero, assume that c=0, also assume that the weight of A and B are the same to simplify the example.

From equations 6, 7 and 8, the following can be calculated:

Velocity of A immediately after impact = 10 ft. per sec.

Velocity component of B immediately after impact in the direction of the normal impulse = 10 ft. per sec.

Velocity component of B immediately after impact in the direction perpendicular to the normal impulses = 40 ft. per sec.

These velocities are shown in Fig. 5.

If both vehicles skid, the work-energy equation No. 9 can be used to determine the displacement of each vehicle. The displacements in the case of this example are shown in Fig. 6.

Note that a hypothetical case has been taken and the direction and magnitude of the displacements after impact corresponding to the initial chosen velocities have been determined. Only basic relations were used and they may be found in any textbook pertaining to dynamics.

Error Involved in the Energy Method

Assume, now, that the collision considered in the previous example actually occurred and that a police officer took data which included the displacement of each vehicle from its skidmarks. When these displacements (Fig. 6) are substituted into equation No. 2, which neglects the energy lost in impact, the so-called minimum speed of A before impact is 22.6 feet per second.* If this case were brought to court, the jurors would be told that vehicle A was traveling at a higher speed than 22.6 feet per second. Obviously, there is a mistake because the assumed speed just prior to the impact taken for vehicle A in the hypothetical case was 20 feet per second. The error is not in favor of Driver A.

As previously stated, the error lies in the fact that if the energy used in moving vehicle B sideways is determined as suggested in the energy method, then work and kinetic energy have been assumed to be vector quantities. Work and energy are scalar quantities as indicated in equation (2) and direction cannot be assigned to these quantities. This energy method, as presented in traffic publications, is valid only when vehicle B is not moving prior to impact. As the ratio of the speed of B to A becomes greater, the error increases. Although the initial chosen speeds here may seem impractical, it is of no significance since an error exists regardless of the speeds.

The energy method would be even more incorrect for an oblique collision. On the other hand, appropriate impulse-momentum relations can be written for an oblique collision as well as the right angle collision assumed for the example used herein.

Application of the Impulse-Momentum Method

Only the special case of a direct broadside collision was considered here. In a collision of this type, the weights of the two vehicles, the direction that the struck vehicle tends to move immediately after impact, and any one of the four velocities must be known to calculate the speeds of both vehicles before impact.

If, for example, the struck vehicle B skids a certain distance after impact, its velocity immediately after impact can be determined from a skid-speed chart, provided that the vehicle does not hit an obstruction. From equations Nos. 6, 7 and 8, the velocity immediately after impact of the striking vehicle A and the velocities of both vehicles before impact can be calculated.

A more general type of collision is eccentric impact. In this case, immediately after impact, the struck vehicle B will tend to move in a particular direction, but the vehicle will have an angular velocity as well as a linear velocity. By knowing the total linear displacement and the angular displacement, it is possible to approximate the linear velocity and angular velocity immediately after impact.

By assuming these two conditions, a theoretical plot can be made showing the various positions of this vehicle, say for every tenth of a second, until it comes to rest. As this vehicle is rotating and translating, the theoretical plot will show the path of each of the four wheels. In addition, the direction of motion of each wheel will be indicated; and when the direction of motion of any wheel is parallel to the axle, a very heavy skidmark should be present. The positions and directions of these skidmarks should correspond to those in a photograph taken after the accident or be shown on a

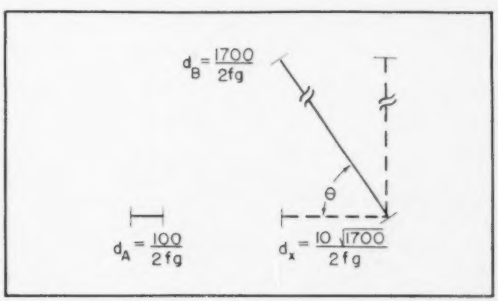


Fig. 6

(Continued on page 304)

*The unknown quantities cancel out in this equation when the weights of both vehicles are assumed to be the same.

Ten Traits of City Councilmen

By Arthur W. Bromage

Professor of Political Science, University of Michigan

COUNCILMEN are another brand of that famous species known as "the politician." Viewed often with suspicion and subjected to derogatory comments, they thrive in spite of the rigors of municipal democracy. What makes these political animals tick? Are they just born to be politicians? Surely they don't learn the art in school or college. While universities pride themselves on training public administrators, few admittedly devote themselves to the making of politicians. No, politicians are developed largely in the school of hard knocks. Their training is in-service training on the city council.

What are some of the discernible characteristics of these Americans who seek to make democracy work by serving as politicians in public office? In my experience, they have certain traits. 1. They are willing to serve! 2. They recognize names and faces. 3. They often, for some strange reason, wish to be re-elected. 4. They like to sit tight until they estimate how to vote on a particular question. 5. They are not adverse to publicity. 6. They take administrators with a grain of salt. 7. They take "experts" with two grains of salt. 8. They are themselves generalists, except in the specialized techniques of handling fellow citizens and taxpayers. 9. They have stamina. 10. They are willing to compromise.

They Are Willing to Serve

This is evidenced by the fact that they became candidates for public office. Many politicians claim that they are drafted, and that they continue to serve, at great sacrifice, in the public interest. This is often a pose. It may be good for a campaign, good for election, good even for re-election. Some stalwart citizens are drafted, to be sure. But the real politician wants to run. He likes it and that's why he does it.

Membership in a city council is like membership in a club, an especially active and fascinating club. Something or someone is always "popping." It may be a new ordinance, a new pay plan, or a new contract. Moreover, the councilman has power to do something about these "pop-ups" and "pop-offs." He can vote. When he votes, something happens, or doesn't happen. That makes life exciting.

Surely, most councilmen serve out of a sense of duty and in the public interest. Fundamentally, however, they do it because they like it. Very few councilmen, in my purview, complain about a term on the city council. They may do so from time to time, but underneath the pretense of lament is a solid satisfaction. They don't want the public to know how much they enjoy the process.

They Recognize Names and Faces

Watch the councilman when the meeting breaks up. If he sees one or more of his constituents in the audience he makes a break for the rail with hand extended. He is performing the political process of combining name, face, and handshake. Now, why does he do this? It can't be just because he wants to build or repair a political fence. The councilman is the kind of person who likes to shake hands, talk, and expostulate. Otherwise, we may assume that he would be at home, reading a book, playing with electric trains, listening to the radio, or watching TV.

At a public hearing the councilman scans the audience, like a watch on shipboard scanning the sea. What is the councilman looking for? It's the same old thing: familiar names and faces. Also, he may pick up a new name and face to add to his mental files.

A councilman does business out of his hat. The administrator has an office, secretary, files, and telephone. His *modus operandi* is usually at a fixed place. On occasion, he picks up his charts and tables, carries them to the council chamber, and educates the councilman. The latter has no fixed *situs*. He travels around town, talking here, making an approach there, gathering and disseminating information on the move. Wherever he stops, there is a conference, table or no table. In this kind of an operation, it is vitally important to know names and faces, to know whom to trust, to evaluate the disinterested, the belligerent, and the reasonable citizens and taxpayers.

Councilmen learn names and faces because voters like to be recognized on sight. It gives them a sense of significance. *They expect to be recognized.* This effort on the part of the councilman demonstrates that the voter is, after all, sovereign. The office holder is the subordinate in the process. He tries to make the overtures, and woe betide the inexperienced councilman who fails to recognize an important personage, namely, any voter. When an unknown constituent calls on the telephone, the smart councilman learns all he can about him, his address, his business, his complaint, and his relatives. All this is filed away for future evaluation and reference.

They Often, for Some Strange Reason, Wish to be Re-elected

One term on a city council is rarely enough for the politician. He is just beginning to hit his stride. His mental files bulge with information about things and people. City-hall procedures are no longer a mystery. He has learned when to stall and when to advance. His knowledge of administrators has reached the point where he can classify them as good, bad, and indifferent. He has become habituated to nights at city hall, to the little restaurant around the corner, to the rehashing of decisions and the formulation of new policies. It is natural to keep the fly wheel of habit turning.

Beyond this lies the significant desire for endorsement. One might get elected to a council as a "fluke." To really prove the case, it is necessary to make a first-term record and be re-elected. One good term deserves another, you know.

This is one of eleven articles which the George Wahr Publishing Company, Ann Arbor, Michigan, will publish in a booklet entitled "A Councilman Speaks."

They Like to Sit Tight Until They Estimate How to Vote on a Particular Question

Councilmen do not wish to be startled by administrators into making a major decision in a hurry. They have to have time to "chew the cud," and determine its flavor. Their intimate knowledge of the voters will give them an off-hand reaction. It is still necessary to let the news of probable policy reach into the voters' castles by press and radio. If no telephone calls come in, the councilmen know that the public is either indifferent or acquiescent. It may be safe to go ahead. If a telephone barrage begins, councilmen must ascertain the direction and force of the attack, and the weight of any counter-attack. After the shooting is over, the councilmen will be ready to make up their minds. This is widely known as the technique of delay, and it is one of the tools of councilmen.

They Are Not Adverse to Publicity

Administrators may have a passion for anonymity; not so the politician. He thrives on the newspaper story which tells about his speeches, policies, conflicts, thrusts, brushes pressure groups, and so on. Even a funny story arising out of some chance remark in council is still publicity. It's the old business of name and face. The councilman must make the voter conscious of his own name and face in association with program and policy.

Councilmen are well adjusted to speeches by fellow councilmen which are made for the record. Everyone knows that these sage or belligerent remarks will appear in the next edition of the hometown paper and will sputter over the transmitter of the local radio station. It's all part of the great game of politics. No one sounds off like that in a committee meeting, for the visible and the invisible audience are missing.

They Take Administrators With a Grain of Salt

They have to do so. Administrators never have enough equipment and manpower to do the job right. At least, that is the proverbial story at budget time. Administrators in police, fire, public health, public works, parks and recreation are functional specialists. They are to be commended for their desires to make their operations bigger and better. They logically wish to give the public more service, although it will inevitably cost more money.

The politician often wants to go along with administrators. Time spent at city hall has made him also cognizant of necessary improvements in capital outlay, in new equipment, and in additional manpower. Yet, the politician must also think of the reactions of the citizen when his taxbill comes through the mails. Therefore, he takes the administrator's requests with a grain of salt, and he is quick to recognize any administrator's proposal which is, politically speaking, out of this world.

The antagonism which often burgeons between councilmen and department heads points to the validity of the council-manager plan. The city manager is an administrative generalist who deals with the whole range of municipal operations. Serving, as he does, between the councilmen and departmental administrators, he can and must educate both groups. He must temper functional specialists to the realities of budget and general policy, and impress councilmen with the values of sound departmental programs.

They Take "Experts" With Two Grains of Salt

Beyond the administrator lies the expert. He is the local or outside consultant who is brought in to give evidence about planning, procedures, processes, proposals, and programs. One time it may be a new method of garbage disposal, another time it may be a new-style parking structure. The clash between the politician and the expert is similar to the gap between the former and the administrator (functional specialist).

The councilman is a generalist and often ignorant of, or inexpert in, many specialties. As a generalist he is quick to resent anything which smells of the lamp or smacks of gobbledygook. He doesn't like theorists who advise a course forward to unattainable perfection, and he doesn't like experts who use big words and strange terms. The former make the politician too conscious of his own failures and shortcomings; the latter give him an inferiority complex which flares out in strange and aggressive reactions.

The councilman must necessarily walk with the aid of two crutches: the administrator and the expert. He has to lean heavily on both when the going is rough in finance, policing, fire-fighting, public health, or public works. Much as the politician might wish to walk alone, he cannot do so. He has neither the time nor the inclination to be a specialist. Sometimes he resents his dependency. Off the record and in the corridor, he can relieve his reactions by talking to colleagues about bureaucracy and expertise. Any slip on the part of the infallible administrator or expert will be treated as a lapse which the good old council will have to patch up, by revising an ordinance or paying damages.

Here again a manager has a real role to play in the administrative process. He can keep the expert one step removed from the council. In a council-manager city experts generally are called in by, and report to, the manager. The manager's recommendations to council may or may not follow those of the expert. The manager is best qualified to weigh expert testimony and to shape it into proposed policy for consideration by the council.

They Are Themselves Generalists, Except in the Specialized Techniques of Handling Fellow Citizens and Taxpayers

Councilmen, other than old-timers who have served many terms, are generalists in municipal administration. They may know the difference between a pumper and a high-pressure fog truck, but this hardly qualifies them to determine which piece of apparatus should be purchased this year. Oldtimers get to have a smattering of expertise. Experience has taught them that there are legal technicalities, that certain procedures are standard. By and large, however, politicians are generalists with specialized knowledge of the voters. They know how to handle their fellow citizens and taxpayers.

The councilman specializes in the irate telephone call which runs into fabulous amounts of time. He must listen patiently about traffic tickets, dogs, garbage, snow removal, zoning. In each case he must decide whether he will do something or nothing. Often he must sidestep and let the administrator catch it.

To go too fully into aldermanic techniques of dealing with the public would give away trade secrets which politicians cherish. A few may be noted. Take it all with a smile and without loss of temper is one method. Always be willing to investigate and come up with an answer later is another. Play off opposing interests. Be silent at public hearings while the opposing forces tear each other apart.

Never promise what you can't deliver. Remain neutral until the facts and forces establish a trend line. Let someone else front on a critical issue and take off most of the heat. Be positive for those things on which there is general agreement.

The ultimate technique is the city politician's trek to the small village where there is a favorite restaurant. There, happily, for a few hours he cannot be reached by telephone or messenger. Going to conferences in distant (the more distant, the better) cities is another temporary escape. While the politician may like his job, like all workers he must get away from it all, now and then.

They Have Stamina

Most politicians of my acquaintance have a lot of endurance. They can take quite a beating; physically, mentally, and emotionally. They must have good resources in energy, for they are starting out to do battle just as other fellow citizens and taxpayers are settling down to the evening paper before the fireplace.

A two- to three-hour committee or council meeting on top of a day's work requires some expenditure of effort. Yet, week in and week out, these politicians have the stamina to stay with it, through billows of smoke and reams of argument. Reformers who make sporadic drives to alter and modify things can well take a lesson from the relentless persistence of certain politicians. Some of these oldtimers "never miss a trick." They know everything that happens at city hall almost before it happens. They rarely seem to grow tired of the changing panorama. Their very doggedness wears down those who seek to reform, to change, or to seize control.

They Are Willing to Compromise

Councilmen must develop a tolerance for the middle course. To achieve anything the politician must be part of a majority. The majority tends to avoid the extremes of standpat and of ultraprogressive positions. Tolerance for a multiplicity of views forces compromise. Another phrase for this is bending. You bend a model or an old ordinance into a shape which will be agreeable to as many people as possible. If you can't give the police chief the six new rookies he wants, you try to give him three—one for each shift. If you can't raise the pay of patrolmen substantially, you provide a uniform allowance. There are many ways by which sharp edges can be rounded, tempers cooled, and face saved all around city hall. This is the art of trimming, which is a way of spelling compromise in a derogatory manner.

Young and scientifically minded administrators will do well to study the politician. His characteristics are legion. Herein we have touched on some of his most obvious hall marks. His most potent lesson, for all concerned, is that no program, however scientific, can be made to stick in public administration, unless the public accepts it. Beneath the politician's amateur pose and nonchalant manner is his own brand of expertise. He is willing to serve. He mixes well. He seeks success by re-election. He delays, to find out. He takes publicity in stride. He takes administrators and experts for what they are worth, but with grains of salt. He specializes in the techniques of handling voters. He has stamina. He is not afraid to compromise. Without him administrators and voters would have no one to blame but themselves. What a marvelous thing is democracy!

Public Management, April 1951, No. 4, International City Managers Association.

(Continued from page 301)

sketch by a police officer. This is a trial and error solution because the angular and linear velocities immediately after impact must be chosen so that the theoretical plot corresponds to the actual course of the vehicle.

When these two velocities immediately after impact have thus been determined, and knowing the weights of the vehicles, their moments of inertia, etc., four equations for eccentric impact may be used in determining four unknown quantities. An angular impulse-momentum relation is the fourth equation in this more general case.

From the four equations mentioned above, the eccentricity of the impact may be calculated. This tells where the struck vehicle was hit and this value might be checked with a photograph of the damaged vehicle.

The velocity after impact of the striking vehicle A can be calculated and also might be checked by its skidmarks after the impact. In addition, the speeds of both vehicles before impact can be determined. Although skidmarks may appear as a maze of lines, the locations and directions of these skidmarks are as important in accident investigation as fingerprints are in criminal investigations.

There are other types of collisions, such as sideswipe, where the impulse-momentum equations might not be applicable. Yet, a number of types of collisions have been analyzed by this method with good correlation between the results of the calculations and the actual course of the vehicles in collision. This is as it should be!

Impact should be fully understood before approximate methods are used in analyzing accidents for presenting the results in court. A better understanding of dynamics as applied to motor vehicle collisions, will eventually lead to a more nearly complete investigation of an accident on the part of a police officer.

Tulsa-Oklahoma City Toll Road Moves Ahead

The Oklahoma Turnpike Authority will call for bids sometime this month on 22 miles of grading and drainage on the Tulsa-Oklahoma City toll road. The Authority will request specifications for surfacing with both cement and asphalt in five-mile sections. A committee of three engineers reported that "local conditions, availability of materials and characteristics of construction may result in some portions of the turnpike being built of concrete and other portions of asphalt."

Average Vehicle Speed Declines In 1950

The average speed of all vehicles is 47.4 miles per hour, or 0.2 miles per hour slower than that reported for the 1949 studies, according to the Bureau of Public Roads. Truck and bus speeds have dropped slightly from those reported in 1949, but the average speed of passenger cars remains at exactly the same level.

Efficiency of Four-Way-Stop Control at Urban Intersections

By J. Marshall Keneipp

Civil Engineer, Illinois Bureau of Highway Research

WHAT is the efficiency of an intersection operating as a four-way-stop? Although personal opinions of this device are numerous, hard facts are scarce. Despite this lack of conclusive proof pro or con, use of this control method is increasing.

Lighter volume intersections are becoming more and more problematic. They cannot be solved as rapidly as heavy ones for an obvious reason: Lack of sustained volume to warrant the high cost of a signal installation. Consequently, when public and official pressure demand that something be done to control a light volume intersection, often a few stop signs are dusted-off and the problem is solved; or is it?

The Manual on Uniform Traffic Control Devices comments on the subject with this brief statement, "The Four-Way-Stop installation, where legal, has been found useful as a safety measure at some locations. Because of its delaying effect, it should be sparingly used. It should not be used unless the volume of traffic on the intersecting roads is about equal. Where there is any considerable volume of traffic, a traffic-signal installation is the more satisfactory solution."[1]

Reasons For Use

There is no single, clear-cut reason for installing four-way-stop control. However, traffic and city engineers rate the following reasons as popular (according to popularity):

(1) To reduce accidents
(2) As a stop-gap before signals
(3) To increase efficiency of congested streets.

Assuming that the first reason is valid, there remain two other bases for using the four-way-stop. Actually, the matter of efficiency enters into each of these remaining motives.

The purpose of this study was to evaluate what happens to the efficiency of an intersection which is changed from two-way to four-way-stop control. In other words, relative to a two-way-stop, how efficient is a four-way-stop? Limited time allowed research on only urban intersections.

TABLE I

Summary of average crossing times (seconds) at four-way-stop intersections (either major or minor streets)

	Slow	Stop
Straight through	13.0	20.0
Right turn	12.2	19.4
Left turn	13.5	19.5

Note: "STOP" represents values for vehicles that made complete stop at sign. All others were classified "SLOW."

[1] *Manual on Uniform Traffic Control Devices for Streets and Highways*, Public Roads Administration, August, 1948, p. 20.

TABLE II

Summary of average crossing times (seconds) for the stop street at a two-way-stop intersection

	Slow	Stop
Straight through	13.0	24.0
Right turn	11.6	23.0
Left turn	13.5	24.0

Data Collection

Locale of the investigation was Champaign-Urbana, twin Illinois cities of nearly 70,000 population. At the time of the study, 19 intersections were controlled with four-way-stops. Data were collected at seven of these intersections.

Two types of data were gathered:

(1) Timing data which recorded the period required for vehicles to clear two and four-way-stops.
(2) Data recording the manner in which motorists obeyed stop signs at these locations.

Data of the first type, compiled at four intersections, were based on the times recorded for 3219 vehicles. This was approximately 15% of the total volume passing the points during data collection. Over 6800 additional observations were made of obedience to stop signs at these same four intersections. To furnish additional obedience data, 7100 extra vehicles were observed at still three different four-way-stop intersections.

Most of the study was devoted to three of the seven intersections: (a) Two, regular, established four-way-stops; and (b) A two-way-stop which was converted to four-way control. To insure comparable results, the two established four-way-stops were selected because of similar characteristics and freedom from traffic signal interference. Before and after data were compiled from the intersection which was converted.

Zones of Influence

Identical zones of observation at all of the intersections were established prior to data collection. An Enoscope was located 100 feet from the center of the intersection along each approach. Thus, the time required by vehicles to pass any two Enoscopes provided a value from which the speed of the vehicles through the intersection could be determined.

One observer standing at the indicated point could observe all Enoscopes and thus tell exactly when a vehicle came within the zone on any leg, as well as when it left the zone on any other leg. When a selected vehicle entered the zone of influence, the observer started a stop watch and

This article is based on Mr. Keneipp's thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering in the graduate college of the University of Illinois.

TABLE III

Summary of average crossing times (seconds) for the through street at a two-way-stop intersection

	Unimpeded
Straight through	5.2
Right turn	8.0
Left turn	8.0

identified the vehicle to the recorder. The recorder then noted how the vehicle moved—whether a straight through movement, a right or left turn. He also noted how the motorist obeyed any stop sign he passed. Thus, a complete record was obtained for each vehicle selected.

Size of Sample

Size of the timed sample varied from 10% to 23% of the total intersectional volume. Vehicles were selected in a random pattern including all possible movements from both streets. Additional manual counts provided further information on obedience to stop signs. At least three separate manual counts of from 60 to 90 minutes each were made at the chosen intersections at corresponding times. Almost 7000 vehicles were recorded during six similar periods at the two, regular established four-way-stops. Similar data, for vehicles not required to stop, evaluated average street speeds.

Analysis of Data

Tables I, II, and III are based on timing data only. For the most part they are self-explanatory; however, two points should be noted in their study. First, they represent the time in seconds for a vehicle to pass through the zone of influence, 200 feet. Secondly, all vehicles rolling past stop signs were classified as "Slow." In order to be classified as "Stop" a vehicle had to come to a dead-halt. Use of only two categories eliminated opinion from the data.

The results shown in these three tables were combined with the analyses of the obedience study. This latter data evaluated such factors as: (a) What percentage of motorists came to a full stop at stop signs (on both major and minor streets of four-way-stops, and minor streets of two-way-stops); (b) Was this value different for motorists desiring to make different movements; and (c) How were these affected by varying volumes.

Table IV shows the result of combining timing and obedience data. Take the first line in this table as an example. Assume that for a given period of time "S" has a value of 100 vehicles. This means that 100 vehicles pass straight through the intersection on the major street. The total average time required for this movement with the intersection operating as a two-way-stop would be 100x5.2 or 520 seconds. Note that under two-way-stop control these vehicles would not be required to stop. Now, assume that the intersection has been changed from two to four-way-stop control. The total average time for 100 major-street vehicles to clear the zones of influence becomes 100x13.9 or 1390 seconds. Thus, the average net cost to these 100 vehicles is 870 seconds.

There is no need to use the first two columns headed "Time under two-way operation" and "Time under four-way-stop operation" to arrive at the net average time cost or saving. For these values, only the last columns "Cost" and "Saving" need be used.

Limitations of Data

In using the factors given in Table IV, it must be borne in mind that they are average values and reliable only when the following limitations are considered:

(1) Values are based on intersections with total volumes of under 1000 vehicles per hour.

(2) All values are based on average observance of stop signs. In other words, they apply to a locality where a rolling or gearshift stop is permitted.

(3) The table is based on the assumption that the relative volumes will remain practically unchanged after conversion from two to four-way-stop operation.

(4) The table applies entirely to urban intersections.

Conclusions

A study of Table IV will point out that under no conditions can an intersection operating as a four-way-stop be more efficient than under normal two-way control. In fact, the data further indicates that under optimum conditions, the conversion from two to four-way control will result in a time *loss* to the major street twice the saving to the minor street.

Therefore, with these conclusions in mind, there can be no logical warrant for a four-way-stop except as a safety measure or as a device to satisfy pressure groups that demand action at an intersection warranting no action.

TABLE IV

Effect on Crossing Times From Changing a Two-Way-Stop Into a Four-Way-Stop Intersection (Seconds)

	Time Under Two-Way Operation	Time Under Four-Way Operation	Cost	Saving
On Major Street Approach				
Going straight through	5.2	13.9	8.7	..
Turning right	8.0	12.7	4.7	..
Turning left	8.0	14.4	6.4	..
On Minor Street Approach				
Going straight through	18.5	13.9	..	4.6
Turning right	15.4	12.7	..	2.7
Turning left	18.8	14.4	..	4.4

By Paul W. Rice (Jun., ITE)
Traffic Engineer, Tulsa
and
Capt. C. E. Riggs
Traffic Director, Tulsa

The Yield Sign

THE need for a sign, less restrictive than a "Stop" sign, to be used at minor intersections, is a "hardy perennial." In the past, signs of several designs to accomplish this purpose have been tried without outstanding success. Tulsa has designed a new YIELD sign to be tried out at a number of intersections. Many cities will be interested in the results of this experiment. *Your* comments are invited.

Approximately two intersections with high accident experience will be signed with the new YIELD signs in the outlying residential districts in Tulsa. Much thought and study have been given to the shape of the YIELD sign. The Keystone shape was selected because of its unique shape, its non-use at present for traffic signs, and economy. In design the sign is simple, legible, and has a distinctive shape of its own so as not to be confused with other traffic signs. It is designed to be especially clear in meaning during its probationary trial use.

The signs will go through a transition stage of wording until they attain utmost simplicity and can be understood at a glance. The first design is shown by the photograph below. The second design, after the educational period is complete, will be the use of the one word "YIELD" with the ultimate goal of having the word YIELD be as universally understood and accepted as the word "STOP" is at present.

The educational part of projecting the YIELD Sign into public use is already under way in Tulsa. The first two signs are now functioning at First and Columbia in the City of Tulsa. Casual observations and questioning of several drivers indicate they comprehend the meaning of the signs at the first glance. The drivers slow up, look carefully both ways, yielding to vehicles on the intersecting street and generally proceed on across without coming to a stop, rendering exactly the desired results.

A newspaper feature front page story has been released in Tulsa with a picture of the sign, explaining its purpose. The *Sunday World* is Tulsa's only Sunday paper and will go into ninety per cent of Tulsa homes. The sign will be shown and explained in Tulsa Civic Clubs and the local high schools. A television program is scheduled at an early date.

The last and most important aspect of the new Yield Sign will be, of course, the enforcement policy appended to its use. A City Ordinance has been prepared reading as follows:

"The driver of a vehicle approaching a YIELD right-of-way sign shall slow to a reasonable speed for existing conditions of traffic and visibility, yielding right-of-way to all vehicles on the intersecting street which are so close as to constitute an immediate hazard. The driver of any vehicle proceeding past a YIELD right-of-way sign facing his vehicle and who interferes with or collides with the movement of any vehicle proceeding on the intersecting street, shall be deemed prima facie in violation of this section."

The driver of a vehicle who fails to observe a YIELD right-of-way sign will also be in violation of an already

existing traffic ordinance that makes it an offense to disregard an official traffic control device.

All officers of the Tulsa Police Department will be instructed to arrest drivers in violation of these ordinances immediately. It is unfortunate, but true that the intersections to be controlled by the new sign are so widely scattered that seldom will an officer see violations as they occur. However, the Accident Investigation Officer, arriving on the scene of an intersection collision where one driver has failed to obey a YIELD Sign, will know instantly that the disregarding driver is to be arrested and if there is evidence of the other driver driving at excessive speed, then both are guilty of violations.

It is hoped the YIELD Sign will be the long awaited traffic sign that will decrease the number of open intersection accidents.

Pan-American Highway Congress

The agenda for the Fifth Pan-American Highway Congress, scheduled for October 8 through 14, 1951, at Lima, Peru, was recently released by the Peruvian government.

The agenda includes five sections: (1) technique of highway engineering, covering planning, construction, improvement and maintenance of highways, (2) traffic, covering movement of vehicles on the highways, (3) economics, financing, administration and legislation, covering the legal, administrative and economic problems with respect to roads, (4) education, dissemination of information and publicity, covering aspects tending to improve and extend teaching of highway engineering and informing the public of the benefits of roads, and (5) international affairs, covering uniformity of signs, signals and classifications.

A sixth section on "Inter-American cooperation in highway planning and construction during the emergency" has been suggested by the Organization of American States and will be recommended for inclusion in the agenda.

Traffic Engineering Division
Oregon State Highway Department

One-Way Street Routings on Urban Highways

THE development of one-way street couplets has offered a solution to the traffic problem on state highways in central business districts of a number of cities in Oregon. The Traffic Engineering Division of the Oregon State Highway Department, on the basis of experience had to date, believes that these couplets give a maximum return per dollar expended.

This experience in six Oregon cities is summarized in the accompanying table. The "before" and "after" studies each cover a period of one year. The "after" studies in Eugene and Medford were made during the war years. This accounts for the decrease in volume; however, the reductions in volume on the one-way couplets were less than on adjacent streets.

Travel time was reduced on all couplets. The average time savings for all cities was 0.78 minutes per vehicle.

The total of reported accidents on the couplets was 1344 under two-way and 1011 under one-way operations. The number of persons injured dropped from 164 to 84. The number of fatalities was too small to form a definite pattern. Of greatest significance, is the reduction in accident rate. The average change in accident rate for all of the cities was a minus 36.4 per cent.

The reduction in accidents during the periods of study resulted in annual savings ranging from $400.00 in Pendleton to $36,500 in Eugene.

Change in Traffic Operations Resulting From Conversion of Two-Way Streets to One-Way Couplets in Several Oregon Cities

City and Population	Volume ADT % Change	Travel Time Minutes	Total Accidents % Change	Persons Injured % Change	ACC/M.V.M % Change
Eugene—35,672	−26.4	−1.52	−62.5	−56.8	−48.5
Medford—17,170	−13.6	*	−48.5	−68.2	−45.6
Portland—371,011	+31.2	−0.95	+ 1.7	−43.5	−26.2
Lebanon—Less than 15,000	+ 9.9	−0.10	0	−64.6	−22.8
Pendleton—Less than 15,000	+ 3.7	−0.55	− 6.4	+ 8.3	−15.3

*Data Not Available

DIFFERENT TYPES
For different traffic needs
The Steel Head
SUPERIOR
Supreme in strength; in resistance to damage and vandalism.
The Low Cost
HUSKY
Makes Karpark dependability available at a minimum investment.
THE WISE CHOICE
The Versatile TWIN-O-MATIC
One installation times two cars; has every wanted feature.
The Adaptable UNIMATIC
Takes care of any parking situation—beautifully and efficiently.
The "First Family" of Parking Meters
KARPARK
A METER FOR EVERY PARKING NEED
Write for data to THE KARPARK CORPORATION CINCINNATI 6, OHIO

Festival of Britain

Two-Week General Tour of Midland and Northern England

The Town and Country Planning Association, London, has planned a two-week "Festival of Britain" tour of Midland and Northern England from June thirtieth to July thirteenth. The Association extends a warm welcome to readers of *Traffic Engineering* who are visiting Britain and wish to attend this tour.

This tour will place some emphasis on housing and town planning projects, but will also include visits to a number of Britain's famed beauty spots and to places of historical interest, including Stratford-on-Avon, the birthplace of Shakespeare.

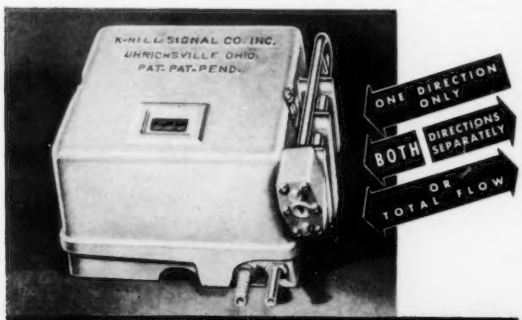
The party will be transported by special coaches throughout the tour and will stay at good hotels only.

TOTAL COST of the tour is £35 which includes all meals from evening meal Saturday, June 30th, to evening meal Saturday, July 14th.

A DEPOSIT of £5 sterling is payable on booking for the tour and the remaining £30 must be received by the Town and Country Planning Association by *first post Monday 18 June*. The deposit is returnable in the event of cancellation subject to the Association being able to fill the vacancy.

REMITTANCES should be sent to:

The Business Secretary,
Town & Country Planning Association,
28 King Street, London, W.C.2.



THE ONLY COUNTER THAT COUNTS EACH DIRECTION SEPARATELY OR TOTAL FLOW

K-HILL Dual TRAFFIC COUNTER

NON-ADJUSTING

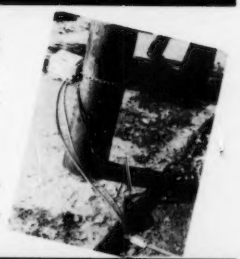
A REVOLUTIONARY DEVELOPMENT IN TRAFFIC COUNTERS COUNTS EACH DIRECTION SEPARATELY OR TOTAL FLOW

Use ONE single road tube on this counter to count total flow.
Use TWO road tubes side by side to count one direction only.
Use these same TWO road tubes with a K-Hill "Dual" Counter at opposite ends of the road tubes to count each direction separately and at the same time.

Both road tubes cross ALL traffic lanes.
No channeling of traffic or divided road tube necessary.
Safer to install. Safer for the motorist.
Traffic flows normally. Greater accuracy.

Some specifications and mechanism on the government approved K-Hill total flow traffic counter.

Send for complete information and prices on this revolutionary "Dual" purpose portable traffic counter.



K-HILL SIGNAL CO., INC.
UHRICHSVILLE, OHIO
SINCE 1932

REFLECTS THE CRAFTSMAN'S SKILL

One of the Answers to Your Traffic Control Problems

the NEW IMPROVED

4000 HOUR MAGNOTRONIC TRAFFIC SIGNAL LAMP

- THE ULTIMATE IN QUALITY
- GUIDE TRAFFIC SAFELY
- DEPENDABLE TROUBLE-FREE SERVICE
- LONG LIFE REDUCES MAINTENANCE COSTS
- LOWEST TRUE COST
- DESIGNED TO YIELD YOU AN ADEQUATE RETURN ON YOUR INVESTMENT

MAGNOTRONIC 4000 hour Traffic Signal Lamps are available in wattages of 40, 60, 67, and 100. The same lamp with a designed life of 5000 or 6000 hours can be had at no extra cost.

A complete line of general service lamps designed for 2000 or more hours of service including STREET SERIES, MULTIPLE SERIES, SPOTLIGHT, FLOOD LIGHT and HIGH VOLTAGE SERVICE.

TECHNICAL KNOWLEDGE ACCUMULATED BY OUR LABORATORIES THROUGH YEARS OF PRACTICAL AND RESEARCH EXPERIENCE STAND BACK OF OUR PRODUCT.

COMPANY REPRESENTATIVES IN PRINCIPAL CITIES

INDUSTRIAL ELECTRONICS CORP.
80 BANK STREET, NEWARK 2, N. J.

TRAFFIC NEWS

Changes in Illinois Highway Division

Major changes aimed at improving efficiency and eliminating overlapping functions in the Illinois Highway Division were announced recently.

Some units within the division were abolished, new ones were set up, and key personnel were assigned to new jobs.

The reorganization was announced by Charles P. Casey, director of public works and buildings. The highway division is a part of the Public Works and Buildings department.

Casey said that in 34 years there has been "no comprehensive re-examination of the organizational structure" of the highway division. He said the sweeping changes should improve efficiency and cut costs.

The most important operational changes effected by the reorganization plan were summarized by the director as follows:

A new bureau of traffic control is established to assume direction of an expanded program of traffic control activities and, in addition, the activities of the present Office of Safety Responsibility, H. H. Harrison (Mem., ITE), engineer of traffic, will remain as head of the new bureau.

The former bureau of audits is replaced by a bureau of administrative service which includes all of the work done by its predecessor in addition to assuming increased duties in the field of business services.

The bureau of highway research is replaced by the bureau of research and planning. In addition to the statistical research work performed by the bureau, it will include physical research work heretofore conducted by the bureau of materials and design, as well as programming functions.

A new office of urban expressway engineers is established. It will be headed by A. L. Kukral of the Chicago district office, who will have the title of expressway engineer for the Chicago metropolitan area. Elmer Knight has served in this capacity until his recent appointment as assistant chief highway engineer.

The present four sections within the bureau of design will be consolidated.

The principal function of the bureau of construction will remain unchanged, but several of its sections will be transferred to other bureaus.

States Grant Emergency Defense Powers

Civil defense bills have been introduced in 27 state legislatures, and have been passed in 12 states.

New laws in Indiana, Georgia, Alabama, Connecticut and Arizona empower the governor to formulate and execute plans to control traffic. Pennsylvania gives this job to a State Council of Civil Defense, to be set up by the governor in time of emergency. The Council may make rules for the control of pedestrian and vehicular traffic during a drill or actual enemy attack.

Bills pending in Minnesota, Vermont and Delaware authorize the governor to make plans for the control of traffic.

Three states, Arizona, Alabama and Tennessee, have empowered the governor to seize, take or condemn all means of transportation, communication and fuel in the event of actual enemy attack. The Connecticut law empowers the governor to take possession of motor vehicles and equipment during an emergency. Georgia's law does not specify means of transportation, but in the event of enemy attack authorizes the governor to seize, take for temporary use, or condemn any property. Provisions of this general nature are included in pending New Hampshire, Vermont, Michigan, Illinois, Delaware and Ohio bills.

The more detailed Vermont civil defense bill also authorizes the governor to set maximum speeds, and to suspend regulations on the entry and operation of out-of-state vehicles during an emergency occasioned by a national disaster or enemy action.

New York's State Traffic Commission, independently of any civil defense legislation, has had several new duties added in connection with national defense. Among them is an inventory to be taken of trucks and buses publicly and privately owned which would be available in case of emergency. The Commission is also empowered to designate certain portions of state highways on which vehicles may proceed in one direction only, or from which heavy trucks shall be excluded. Upon the request of county and town officials, the Commission is given this same authority over county roads or town highways outside of cities, villages or towns of first or second class.

The Federal Civil Defense Act of 1950, defines "civil defense" to include actions to control traffic during an emergency. The law authorizes the President to direct any Federal department or agency to provide temporary replacement of transportation facilities where needed. It also makes provision for compensation for property acquired by the Federal government for purposes of civil defense.

Parking Meter Checkers

Greensboro is not the only North Carolina city with women on the police force. Last year, Charlotte increased its law enforcement staff with the addition of a petticoat patrol. The dozen members of the patrol check parking meter violators in the downtown shopping district. They have no police power other than the issuance of citations. However, they have freed male members of the Traffic Division for other important tasks.

Popular Government

Position Available

Lancaster, Pennsylvania
Traffic Engineer
Starting Salary $3500
An opportunity to gain experience as Head of Department.
Apply to:
HOWARD C. BARE, *Mayor*

34 Engineers Complete Course at Yale

Thirty-four men have just completed the graduate course in traffic engineering at the Bureau of Highway Traffic, Yale University. These men will join 236 engineers already in the field who have completed the course of study at the Yale Bureau.

Many of the men returned to their former positions with various state highway departments and city agencies. Nine of the men have positions in the urban traffic engineering offices of Jackson, Miss.; Montgomery, Ala.; Houston, Texas; Honolulu, T. H.; Cincinnati, Ohio; Wichita, Kansas; Portland, Oregon; Danbury, Connecticut; and Montgomery County, Maryland. Twelve men have gone to the planning and traffic engineering divisions of the state highway departments of West Virginia, New Jersey, California, Texas, Illinois, Oregon, Nebraska, Wyoming, and South Carolina. Two men returned to positions in the Road Research laboratory of England and the Concrete Association of India. Three men have entered military service, two have joined consulting firms, one has gone into educational and research work and the remaining five have obtained positions in closely allied fields.

Citizens of Many Nations Forming Good Roads Associations

Well planned highways generate social and economic benefits that are immediate for the people and the nation they serve. The development in motor vehicle transportation, which follows the building of good roads, under favorable conditions ushers in higher living standards through more efficient intercommunication, more rapid industrialization, and wider marketing of food products and manufactured goods.

Inspired by these benefits which have been so dramatically demonstrated in recent years, the International Road Federation since its founding in 1948 has cooperated with citizen groups and business leaders in many countries of the world. The purpose has been to give counsel in the forming of "good roads" associations, the common goal being to encourage the development of adequate national highway systems.

The success of the Federation has been outstanding, and to date the Federation's activities have been projected into more than 50 countries where free enterprise exists. Nineteen of these countries have national good roads associations affiliated with the Federation. Similar organizations, meantime, are in various stages of formation and the Federation has expectations of ending 1951 with national affiliates in at least 30 countries.

During 1950, the Federation acquired five new national affiliates, four in the Western Hemisphere and one in the European-East area. National "good roads" associations were nonexistent in Latin America and there was only one such association in the whole Western Hemisphere outside the United States three years ago. The existing association at that time—in Canada—was not too active but since has become a very strong organization. There are now nine associations in Latin America and three more are in formation.

The Egyptian Road Association was organized in 1950 as an affiliate of the Federation in the European-East Region. Also under this region are the British Road Federation, Union Routiere de France, Central Overleg, Svenska Vagforeningen, Federation Routiere Suisse, Indian Roads and Transport Development Association, Federation Routiere Belge and the East African Road Federation. In formation are associations in Ceylon, Pakistan, South Africa, Australia, New Zealand, Thailand and Iraq.

Each of these road associations is dedicated to promoting the education of both the public and the government in the social and economic benefits generated from adequate road systems. Each is a clearing house for information related to highways and highway transport. Each provides a non-government approach to technical assistance in the planning, financing and development of highways.

The Federation which has offices in Washington and London, will soon open a third office in Paris. The Paris office, in addition to being the headquarters for continental Europe, Turkey and Greece, will participate in all international meetings on highways and highway transport at Geneva.

World Construction, Vol. 4, No. 2, March-April, 1951. Highway Research Abstracts, April, 1951.

Road Signing in Israel

Mr. J. A. Fraenkel (Assoc. Mem., ITE), Jerusalem, Israel, reports that they are doing what they can to modernize their highway system. Road signing, based on the "European" system, in accordance with the Protocol of the U.N. Conference, 1949, is progressing. Signs are reflectorized by "Scotchlite." Bus-bays are being arranged along the major highways since the motor-bus is the outstanding means of public interurban passenger transportation.

As elsewhere in the world, the parking problem is the major headache, at least in the three bigger towns—Jerusalem, Tel-Aviv and Haifa.

A very simple but most useful device has been developed for regulating traffic in cases where one lane of a two-lane highway is closed for road work, as shown in the photograph. A disk of

about 50 centimeters in diameter is mounted on a pipe which is fitted into a drum filled with stones. One side of the disk is painted green with the word "go" in Hebrew, Arabic and English; the other one is painted red with the word "stop." Two workmen, one at either end of the stretch under repair, are handling the device.

Mr. Fraenkel is the Chief Traffic Engineer, Ministry of Transport and Communications, Jerusalem, Israel.

Arrests Up 40 Per Cent

Arrest for traffic violations, exclusive of parking, have increased 40 per cent in New Jersey since adoption of the state's no-fix summons two years ago, according to Motor Vehicle Director Martin J. Ferber. The four leading causes of arrests in 1950 were speeding, careless driving, disobeying traffic signals and ignoring stop signs. These four offenses accounted for more than two-thirds of total arrests.

Personalities . . .

DAVID M. BALDWIN, better known as Dave, has been affiliated with the *Institute* for more than 15 years. Oddly enough no one seems to know what his number is— the original membership shingle has disappeared and the central office records don't help.

National Safety Council

Dave is proud of his varied experience, although he sometimes says he is a "Jack of all trades" and master of none. He was born in Urbana, Illinois, and has a B.S. in Civil Engineering from Illinois, and also a M.S. from the same school. Since then he has worked for a city police department, been a city traffic engineer, worked for a state motor vehicle department, and a state police department. He has done association work for nearly nine years—with the National Safety Council.

The city police experience was as a civilian clerk in the Evanston Police Department when Frank Kreml was Traffic Lieutenant. Then he became city traffic engineer of Evanston—the first year at the magnificent salary of $100 *per year*, payable quarterly. Fortunately for him that was soon changed.

Later Dave went to Virginia and worked as Safety Engineer for the Division of Motor Vehicles and then the Virginia State Police.

In 1942 he came back to Illinois and went to work for the National Safety Council. His first assignment was co-authoring, with George E. Miller, a book titled "State Traffic Law Enforcement." This was a manual for state police officers and administrators, and is now in its second printing.

Following this there were a number of routine staff assignments, many dealing with accident records. These led eventually to a long study of the relationship of highway design to accidents —work pioneered by C. F. McCormack, then on the Council staff and now on the staff of the Automotive Safety Foundation.

In the fall of 1948, Dave became Acting Director of the Traffic and Transportation Division of the Council, and Director a year later. In this capacity he supervises work ranging from the production of moving picture film trailers and poster design to the determination of the coefficient of friction of synthetic rubber tires on glare ice.

His outside activities have been numerous. He has lectured at Northwestern University Traffic Institute, conducted accident records courses at numerous training institutes, is currently secretary of the Committee on Accident Records of the President's Highway Safety Conference, and has taken part in many committee and joint committee projects.

He and his wife, Frances, have a daughter, Betsy, who is ten and, he says, the light of his life. The Baldwins live in their own home in Park Ridge, a suburb on the northwest side of Chicago, where Dave is a member of the Park Ridge Safety Council, logically enough.

CHARLES R. WATERS was recently selected by the "Buffalo Evening News" of Buffalo, N. Y., as one of 12 outstanding citizens of that city for the year 1950. The citation reads: "For Outstanding Public Service, the Buffalo Evening News hereby awards this Citation to Charles R. Waters as an Outstanding Citizen of Buffalo during the year 1950."

Fabian Bachrach

As district engineer for the New York State Department of Public Works, Mr. Waters was extremely foresighted. He was instrumental during the year in bringing about action for many long-needed state projects to improve Buffalo's physical position. These projects include the Main-Humboldt underpass, High Level Bridge, and the widening of Hamburg Turnpike.

Mr. Waters heads a large engineering organization in Western New York which handles construction and maintenance work on highways, canals, public buildings, flood control, and other projects in which the State is engaged. The money value of the projects underway at the present time, including the New York State Thruway and arterial projects in cities, exceeds $30 million.

Charlie has given much attention to traffic engineering, and is the author of several articles which have appeared in "Traffic Engineering."

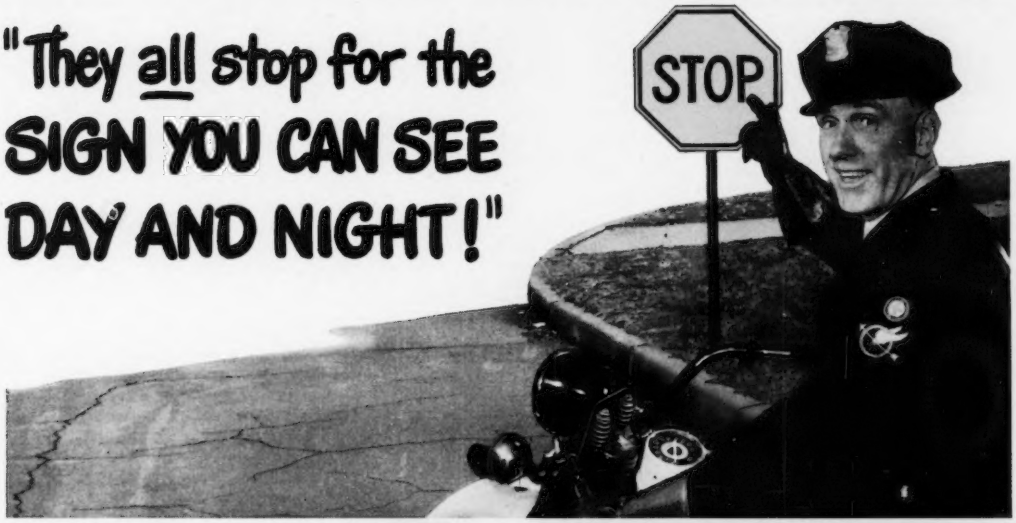
The sign shop in which highway signs for New York State highways are manufactured is operated under his direction. He has taken a special interest in the design of highway signs and materials for their manufacture, and also in the development of equipment for and the standardization of the method of placing traffic lines on the surface of highway pavements. He was a member of the Committee on Signs during the last revision of the Federal Manual on Uniform Traffic Control Devices, and represents the American Association of State Highway Officials on the Joint Committee.

Mr. Waters is a graduate of Union College. He served as field construction engineer on large highway and canal contracts for several years, and prior to the time when he was appointed District Engineer he held an administrative position in the main office of the Department of State Engineers and Surveyors. He is a member of the New York State Society of Professional Engineers and is a past President of the local Chapter. He is a member of the Westminster Presbyterian Church and several local societies and clubs. He is married and lives with his wife and three daughters on Richmond Avenue in Buffalo.

His favorite recreation is golfing and he says that if "par" in golf were 100 as it is in finances, he would be able to shoot par golf.

How "SCOTCHLITE" Sheeting helps you serve the public

"They all stop for the SIGN YOU CAN SEE DAY AND NIGHT!"



STOP SIGNS made with gleaming "SCOTCHLITE" *Flat-Top* Sheeting are clear and vivid—shape and color are instantly recognized. Surface is tough and durable, retains its sparkling appearance years longer. "SCOTCHLITE" Sheeting meets specified requirements for outdoor safety signs.

AT NIGHT headlight beams light up these powerful reflectorized signs in full color brilliance. Signs reflect the same size, same shape, as during daylight hours. Intersections, overpasses, curves and bridge abutments marked with "SCOTCHLITE" Sheeting are SAFER—*day and night!*

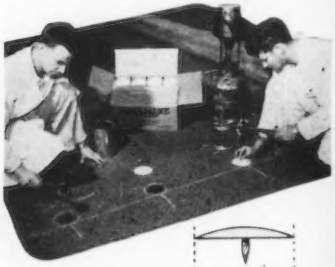
RAIN, SLEET, SNOW make ordinary warning signs difficult to see—but "SCOTCHLITE" *Flat-Top* Sheeting flashes its powerful warning with unequalled brilliance, even through glare ice. No other type of reflective treatment can match this 24-hour, all-weather performance!

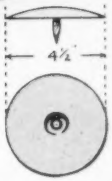
IMPROVE THE SAFETY OF YOUR STREETS AND HIGHWAYS with signs of "SCOTCHLITE" Reflective Sheeting. For complete information on how these signs can help you serve the public, write today to Dept. FE61, Minnesota Mining & Mfg. Co., St. Paul 6, Minn.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Minnesota Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y.

SAVE 50% ON STREET MARKING COSTS WITH DUR-O-LINE

(Available in Safety White, or Traffic Yellow)





A TENITE PLASTIC STREET MARKING SYSTEM

No More Repainting Costs
No More High Labor Costs

- **DUR-O-LINE** markers pay for themselves in one year. Cost of DUR-O-LINE Markers installed equals average cost of 2½ paint jobs.
- **DUR-O-LINE** marked streets are more attractive—the brilliant 4½" markers do not fade or smear.
- **DUR-O-LINE** markers have three times the visibility of painted lines.
- **DUR-O-LINE** markers are designed to withstand severest traffic conditions. Load tests prove that they can carry 15 times the maximum legal load limit.
- **DUR-O-LINE** markers are easy to install. A two-man crew can lay 100 markers in an hour. No traffic tie-ups. Traffic can run over markers as workmen lay them.
- **DUR-O-LINE** markers can be used on either asphalt or concrete pavements.

TRIAL OFFER

As a special offer 200 markers and laying material for 400 to 1200 linear feet is available for only $52. ($67. for concrete streets.) Tes. this sample offer on your busiest street. Shipped prepaid.

TRAFFIC SAFETY SUPPLY CO.
2700 NE Sandy Blvd., Portland 12, Ore.

Centerlines take a beating but stay bright with "CATALITE"

paint · and · bead package for STREET and HIGHWAY STRIPING!

Literally millions of crystal clear reflective spheres embedded in a tough, highly reflective binder give matchless, all-weather performance. CATALITE is available in either "drop-on" or "premix". Send for information and low prices.

Cataphote Corporation
TOLEDO 10, OHIO

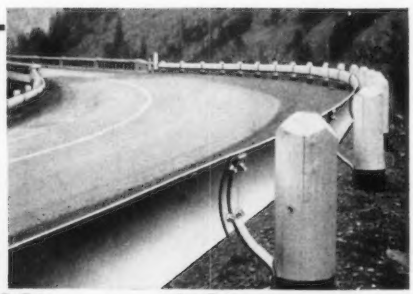
Please rush new FREE CATALITE descriptive pamphlet and prices of your three types of drop-on and also premix for street and highway safety striping. No obligation, of course,

Name_____
Title_____
City_____
State_____

MFRS. AGENTS INQUIRIES INVITED!

Exceeds all state safety specifications

TUTHILL HYWAY GUARD

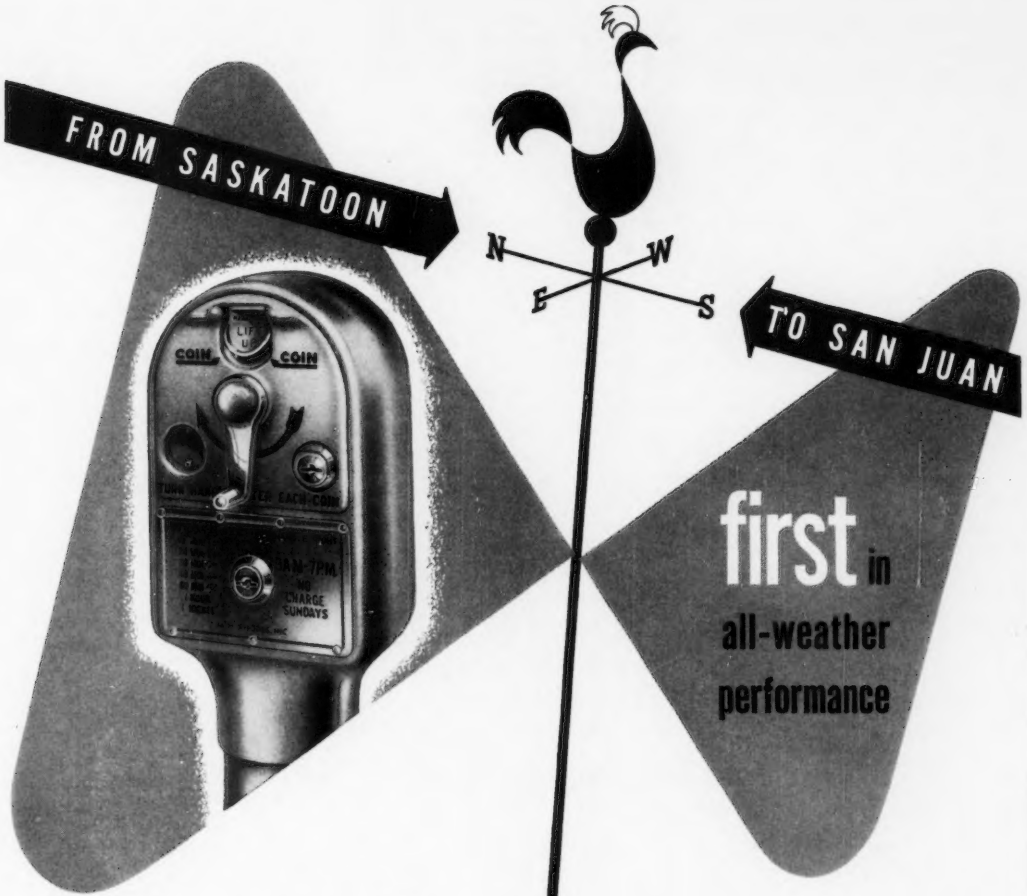


cuts traffic accidents!

Write for technical brochure today!

Super-strong Hyway Guards safely deflect cars and cushion shock to vehicle, occupants and rail. Easily seen by day or night. Speedy, permanent erection with little or no maintenance required.

TUTHILL SPRING CO.
760 W. Polk Street, Chicago 7, Illinois



Neither rain, nor snow, nor sleet, nor hail can stop the smooth, continuous operation of the Mark-Time Manual "Hurricane" Parking Meter. The rugged, simple Mark-Time design, combined with special built in weather-proof features keeps the "Hurricane" functioning at all times, in all types of weather.

From the northernmost regions of the United States and Canada to the semi-tropical climate of the South, Mark-Time "Hurricane" parking meters *could not be stopped* by extremes of weather.

POSITIVE PROOF OF SUPERIORITY was recorded. Where some other meters failed, Mark-Time "Hurricanes" maintained their accurate, dependable control of traffic without "down-time" in the repair shop.

mark-time
manual parking meters

MARK-TIME

M. H. RHODES, INC.
HARTFORD, CONNECTICUT

Manufactured and Sold in Canada by
Ontario Hughes Owens, Co. Ltd., of Ottawa, Ontario

Highway Construction Affected by Controlled Materials

Practically every operation concerned with the construction, maintenance and repair of the nation's highways probably will be affected when the National Production Authority's Controlled Materials Plan (CMP) is inaugurated on July 1, 1951.

However, whether the new plan will result in the curtailment of highway construction programs seems to be dependent upon (1) the overall availability of road building supplies and machinery containing steel, copper and aluminum after July 1 and (2) the attitude of the Defense Production Authority on the essentiality of an adequate road network to meet the needs of national defense.

The plan, as presently outlined, requires that producers of certain listed commodities make application to the government for allocations of steel, copper and aluminium. Manufacturers of trucks and truck trailers, repair and replacement parts, and tires and tubes are tentatively required to make application. Private passenger motor vehicles are included in a listing (with such items as household refrigerators and electrical appliances, jewelry, radio and television sets and other consumer durable goods) for which no applications are necessary.

It is understood that the Defense Production Authority will establish overall allocations and policy while the industry divisions of NPA and the various claimant agencies will administer specific material controls over the segments of the American economy with which they are presently dealing.

CMP will only concern itself initially with defense production but, as the program accelerates, it is expected that civilian production will come in for greater control.

To date, CMP has not been fully worked out as to all its details but a tentative list of products for which application forms will be required includes, in part, construction and mining machinery, machine tools, conveyors and conveying equipment, industrial trucks and tractors, power transmission equipment, fabricated structural steel products and cement machinery. It will be noted that all these materials are required in highway construction and maintenance.

Obituaries

M. O. Eldridge, Member, ITE, died on April 28th at the age of 77, in St. Petersburg, Florida. He was buried in Lenoir City, Tennessee.

"M. O.," as he was affectionately known to his many friends, first went to Washington, D. C., in 1894 to take a position as "expert tracer" in the office of Road Inquiries, an early predecessor of the present U. S. Public Roads Administration.

During the years 1902 and 1919, Mr. Eldridge directed the first road mileage census in the U. S., directed field surveys and studies on management, and administration and traffic.

In 1919 he became legislative secretary for the American Automobile Association and in 1921 he was promoted to General Manager.

He became the first Director of Vehicles and Traffic for the District of Columbia in 1925. In 1946, at the age of 73, Mr. Eldridge retired from an active business life.

Mr. Eldridge was active in the D. C. Commissioners' Advisory Council; he was a Mason and a Shriner.

His wife and two daughters survive.

Roy W. Crum, Honorary Member, ITE, and Director of the Highway Research Board, Washington, D. C., died Sunday, May 13th, at the age of 66, at the George Washington University Hospital, of a heart ailment.

Mr. Crum was one of the nation's outstanding highway engineers and under his direction, during the last year, the Research Board conducted road tests near La Plata, Maryland, to determine the effect of overloaded trucks on the nation's highways.

Before going to Washington in 1928 as head of the Research Board, a part of the National Academy of Sciences, Mr. Crum was engineer of materials and tests of the Iowa State Highway Commission. He was awarded the Marston Medal for engineering achievement in 1948, and served on the board of directors of the American Society of Civil Engineers between 1946 and 1950.

Surviving are his wife and two children.

New Film Promotes Safety For Trucks

A new motion picture, "A Professional Portrait," designed to increase efficiency and safety of commercial motor vehicle operation, has been released by the Automobile Manufacturers Association. The 22-minute public service film aims to promote greater awareness of the responsibilities attendant upon operation of a motor vehicle.

The picture illustrates practices of the trucking industry in selecting and training drivers, and describes current programs resulting in better safety records for large and small fleet operators. It will be available for showing to companies in the trucking industry, to safety officials, state and municipal authorities, educational groups and others concerned with highway safety.

Distribution will be handled by the National Highway Users Conference and the American Trucking Associations, Inc., both with headquarters in Washington, D. C.

New Film on Highway Construction

"Pennsylvania's Great Highway" is a new 19-minute Kodachrome motion picture describing the construction of the extensions to the ultra-modern Pennsylvania Turnpike.

All phases of building a superhighway are shown in this 16mm, sound film. Scenes were filmed throughout the 327-mile length of the original section of the turnpike and the eastern and western extensions.

The Portland Cement Association produced the film, through the courtesy of the Pennsylvania Turnpike Commission. Copies of the film may be secured for showing by writing to the Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois.

Secretary's Column

A civil defense meeting of representatives of national organizations was held in Washington on May 7-8, 1951, under the auspices of the Federal Civil Defense Administration. This conference was called for the purpose of soliciting the cooperation of national organizations in the civil defense program. The *Institute* was among the organizations asked to send representatives to this meeting. President Harry Neal, Director Charles Prisk and your Executive Secretary represented the *Institute*.

Federal Civil Defense activities are, of necessity, limited primarily to the preparation of manuals recommending the organization, training and activities of civil defense groups. Basic responsibilities for civil defense rest with *local government* and *individuals*. If civil defense fails, we may be sure that local government will be to blame.

Manuals are not yet available on the conduct of highway transport in the case of an attack. It is probably not possible to formulate a plan in manual form which would be applicable to emergency traffic on the streets of all cities in America. The *broad* issues, however, seem quite clear. If everyone seeks to flee from a target area in one "grand exodus" we will bring to ourselves a greater catastrophe than that of merely the atom bomb. High speed, poor judgment, taking chances are already the known cause of too many traffic accidents. In addition, emergency equipment of all types will be hopelessly blocked at the first intersection.

To avoid complete collapse of our highway transport, major arteries must be held open for emergency use. This is not as simple as it may seem. Enforcement of this plan may be impossible. Road blocks will not hold panic stricken drivers and without the proper public attitude the most carefully drawn route control plans will fail.

There *is* a defense against the atom bomb. The prospects seem grim but a properly educated and organized public can protect itself without panic and loss of morale. If each individual in your community knows, first, what he can do to protect himself and his loved ones; and, second, what responsibility he must fulfill to help his neighbors, there will be no panic and route controls will be workable.

Thus, the traffic engineer should be active in *all* phases of civil defense. The formulation of route control plans without other disciplines is not enough. What takes place in the streets will depend largely on the "frame of mind" of the public!

Millard Caldwell, Director of the Federal Civil Defense Administration, stated that the members of national organizations can supply community leadership. To assist this leadership, the Administration will furnish motion pictures, radio programs, speakers' kits, consultation, and booklets on the general doctrine of civil defense.

Fred W. Hurd

PLEASE MENTION TRAFFIC ENGINEERING When Writing To Advertisers

MEN WORKING . . .

We're receiving orders for traffic control and highway marking signs in ever-increasing numbers. And we've expanded our plant to take care of this increase.

Some items are available now, and we're breaking our neck to get the critical materials to fill your other requests.

Please bear with us in placing your orders. We will not deviate from the Miro-Flex high standard of quality.

MANUFACTURED BY
MIRO-FLEX CO., INC.
1824 EAST SECOND STREET—WICHITA, KANSAS

SECTION NEWS

Michigan Section

The annual meeting of the Michigan Section, ITE, was held on May 1, 1951. Thirty-nine members and guests met at Saratoga Farms, located some 35 miles northwest of the City of Detroit, and enjoyed an excellent cuisine arranged for by Sammy Levine who served as Chairman of arrangements for the evening. Immediately after the dinner, Sammy held a drawing at which time 24 lucky members and guests received a handsome 3-color pencil. This served as a buffer between the dinner and the main event, and incidentally, Sammy, it augmented the treasury.

The meeting was called to order by President Bauerle, who immediately called on the Secretary-Treasurer for a report on the activities of the Section and an accounting of its finances for the past fiscal year. The Secretary accounted for 38 regular and 16 affiliate members in good standing and reported a favorable balance in the treasury. A letter from Harry E. Neal, ITE President, was read explaining the position of the Board of Direction in not being able to accept the Section's invitation to hold the June Board Meeting in Detroit and extending to the membership of the Section the thanks and best wishes of the Board. The Secretary also announced the election of William Marvin and Max Hoffman to membership in the ITE.

Jerome Franklin, who was called on, described briefly the program for the Planning and Traffic Division of the Michigan State Safety Conference which was held in Grand Rapids on May 22, 23 and 24. Jerry, by the way, was Chairman of the Planning and Traffic Division. He also is Traffic Engineer for the City of Grand Rapids. After some discussion it was decided not to hold a meeting in connection with the conference. Jerry made arrangements for an informal luncheon on the 24th.

President Roger Morrison, Univ. of Mich., pointed out that during the last two Highway Conferences, the subject of traffic engineering had been conspicuous by its absence on the agenda, undoubtedly for two reasons. First, there has usually been a conflict between the traffic engineering sessions and other important engineering sessions resulting in poor attendance; and second, most of the county people who make up a greater portion of the conference are neither interested in nor confronted by traffic problems. Professor Morrison asked for a discussion of the feasibility of holding a separate Highway Conference with the possibility that it might be sponsored entirely or partly by the University. Both Al Malo and Carl McMonagle discussed the merits and objections to: (1) continuing as part of the present State Safety Conference; (2) holding a Governor's Highway Safety Conference; or (3) establishing a separate Highway Conference, possibly being sponsored by both the University and the Michigan Section. After considerable discussion, the Section voted to have the President appoint a committee to study the feasibility of establishing a separate Highway Safety Conference which would cover all phases of the traffic engineering profession.

The President then declared the meeting open for the election of officers for the fiscal year which began May 15, 1951. The following officers were elected by unanimous vote:

President, Arthur Gibson
Vice-President, Albert C. Sherman
Secretary-Treasurer, Samuel J. Levine

President Bauerle expressed his appreciation of having been given the opportunity to serve the Section as President and of the cooperation he had received from the membership. He said he felt that the Section was on a more sound basis than it had been in previous years and hoped that the funds would be used wisely in the future. He recommended a continuation of the membership committee to increase the membership of both regular and affiliate members. It was his opinion that more publicity should be given to the meetings and recommended the appointment of a publicity chairman with whatever committee might be required. He suggested that the Section should take a more active part in legislation pertaining to the traffic engineering field and recommended that consideration be given to the establishment of a legislative committee.

President-Elect Gibson thanked the membership for the honor bestowed on him and informed the group that he would do his best to uphold the confidence placed in him. The new President then appointed the following committee to study the feasibility of establishing a separate Highway Conference: J. Carl McMonagle, Alger Malo, Jerome Franklin and Professor Roger L. Morrison.

Gibson announced that the next meeting would be held at the Warren Valley Country Club with Joe Wehmeyer in charge of arrangements, assisted by R. A. Powell. The meeting was then turned over to John Dobelek who presented movies on how a select few enjoy their favorite sports via Eastern Airlines. John also presented a movie on child safety after which the meeting was adjourned.

Reported by A. C. Sherman
Secretary-Treasurer

New England Section

The May meeting of the New England Section was held at the Tivoli Restaurant in New Haven, Connecticut. There were 31 members and guests present.

The Nominating Committee announced that they had selected the following names to be voted on by the members:

President, Peter P. Hale
Vice-President, F. Houston Wynn
Secretary-Treasurer, Robert M. Williston

Ballots will be submitted by mail.

Mr. Guy Kelcey, the speaker for the evening, was introduced by Ted Matson. Mr. Kelcey discussed the problems involved in planning and locating expressway-type highways in the Newark area. His discussion evoked a number of questions from the audience.

Turning to the work that his firm (Edwards, Kelcey and Beck) is doing on the New Jersey Turnpike, Mr. Kelcey spoke at some length on the problems involved in constructing a stable foundation for the highway across several miles of marsh and tide-flats between Elizabeth, N. J., and the Hudson River. He illustrated his talk with a series of 35 mm color photos taken during construction operations. Beginning with a cross-sectional diagram of a series of sand drains penetrating through the marsh to solid material, Mr. Kelcey explained how the sand served as vertical drains to remove water squeezed out of the marsh when fill material was applied. Other pictures showed the sand barges which bring sand from the ocean off Long Island, the pile-driving equipment in operation, road building in progress, etc.

Some discussion was given to the financing of the Turnpike. Mr. Kelcey observed that if the structure had to be built from ordinary highway revenues, the road would take nearly forty years

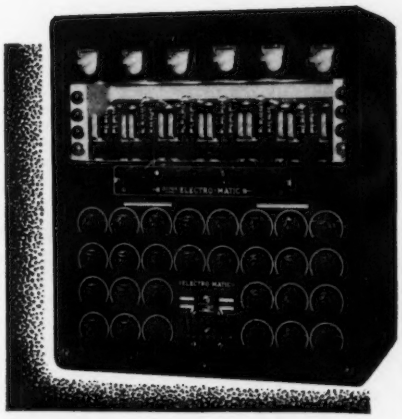
SUPER ELECTRO-MATIC

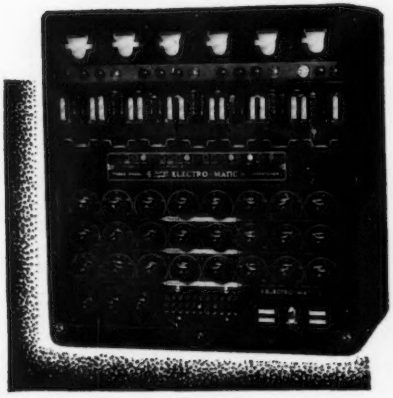
VOLUME-DENSITY CONTROL

For Most Efficient Handling of HIGH-VOLUME INTERSECTIONS

Volume density is the answer to your control problems at high volume intersections. A controller has to be "on its toes" to handle up to 50,000 cars daily. Volume density is doing this job from coast to coast.

Model 1022 SUPER ELECTRO-MATIC brings 2-phase control to its highest pitch of efficiency. Volumes are "counted-in" on both phases. Density of moving traffic is measured and waiting time evaluated. Vehicle and initial intervals are continuously adjusted for best over-all operation. Needless delay is entirely eliminated. Its "platoon-responsive" features facilitate progressions through a series of 1022-controlled intersections, without interconnection.





For the control of difficult high-volume intersections where traffic must be handled in 3 phases, the volume-density principle of the Model 1033 SUPER ELECTRO-MATIC is of utmost importance. Each phase is controlled with maximum efficiency at all times. Any phase having no traffic is omitted from the cycle. There are built-in provisions for signalling up to three overlaps where such movements may safely be allowed.

Send for literature on 1022 and 1033 SUPER ELECTRO-MATIC units.

Automatic Signal Division
EASTERN INDUSTRIES INCORPORATED

TRAFFIC ACTUATED ®

NORWALK, CONNECTICUT

In Canada, write to: Northern Electric Co., Ltd., Belleville, Ontario

to complete. By means of bond financing the road will have been built in two and a half years—the project, 150 miles in length, is to be opened to traffic by the end of this year.

Reported by F. Houston Wynn
Secretary-Treasurer

New York Metropolitan Section

A summer outing was held June 9th at Playland, Rye, N. Y. Guy Kelcey again officiated at the grill and added that final touch to the charcoal broiled steak as only he can. The cut below

depicts some of the fun that was had by those in attendance, which included swimming, boating, softball and amusements at the nearby park.

Reported by Lawrence Lawton
Secretary-Treasurer

Western Section

Bob Glenn and his Nominating Committee worked hard getting the list ready for officers for the 1951-1952 year; the report was made available to the Western Section membership shortly after June 1st.

Jay Blair Jr., Road Inventory and Mapping Engineer for the Oregon Highway Department, Planning Survey Section, has been conducting a surveying course for the Extension Service of Oregon State College.

Val Johnson, Traffic Control Engineer, Oregon Highway Department, spent a busy spring weeding his new lawn, getting ivy to grow on the bank, and building a concrete patio. New homes are certainly a headache, aren't they?

Harry Esch, Design and Layout Engineer, Traffic Section, Oregon Highway Department, put in a new lawn and a lily pond. He spends most of his time keeping the neighborhood kids from swimming in his lily pond!

Lee Kies, Engineer, recently transferred from Traffic Surveys to Accident Analysis in the Oregon Highway Department. He is developing accident rates on the state highway system.

Now that the Legislature is over--116 day sessions—longest in Oregon history—it is a welcome sight to see Bruce Crandall back at his desk. Between junkets to Kansas City and Seattle, he has been trying to do a little work!

Your Secretary-Treasurer has practically turned this column over to his efficient secretary. What with trying to carry on his routine work, coupled with waiting for his wife to call and say "I'll meet you at the hospital," he hasn't been of much use to anyone lately. We'll tell you in the next issue if it's a traffic engineer or a secretary!

As a result of the last meeting of the ITE Board of Direction, the Western Section is pleased to welcome to membership Blair Geddes, Lawrence E. George, John C. Henberger, Harold Marks, R. Nelson Nicholson, Harry Parker, Grannis P. Parmelee, Peter K. Rask and Howard R. Williams. Also, by action taken at the same meeting, the Western Section is pleased to extend its heartiest congratulations to the Canadian Section, but we are sorry to lose two members—Kenneth S. Vaughan-Birch and Murray Zides.

Win Carsten and Russ Bates were chairmen of the Fourth Annual Northwest Traffic Engineering Conference May 17th and 18th at the University of Washington in Seattle. The following Western Section members participated in the program: Bruce Crandall, Norm Kennedy, J. W. Arch Bollong, Harry Aumack, Fred Fowler, R. E. Dunn, D. E. Morris, H. C. Higgins, E. E. Lewarch, R. G. Still, G. R. Cysewski, R. W. Kerslake, J. A. Gallagher, B. R. Culver, M. R. Mitchell and R. H. Warr.

Joe Havenner, General Chairman of the Convention Committee, has had several meetings of the Local Arrangements Committee and plans are progressing in fine shape for a big meeting come September. Al Hutchison is rounding out his technical program and everybody in the Western Section is busy putting the "bite" on someone for the necessities of a good convention.

Reported by J. Al Head
Secretary-Treasurer

Yale Student Chapter

Strathcona Hall has once again quieted down after an eight-month seige by thirty-four *embryo* traffic engineers. As the end of the semester drew near, it became a matter of opinion as to who needed the forthcoming vacation the most—students or faculty. Now that the ink is dry on the theses, and the term is over, the members of the class can look back upon a profitable and interesting year.

The graduating class can practice the knowledge acquired at the Bureau in a large number of organizations. The greatest contingent of the class joined State Highway Departments and urban traffic engineering divisions.

In addition to ITE Section meetings, several picnics and parties were held by the class. The most recent of these was held several weeks ago at Putnam State Park. The event was a "roaring" success.

It was with some regret that the last days of school drew to a close and the class was separated, but many friendships were made that will often be renewed.

Reported by Robert E. Barkley

LOOKING AHEAD

JUNE 29-30, 1951—DENVER, COLORADO
Colorado Governor's Highway Safety Conference.

AUGUST 27-30, 1951—WASHINGTON, D. C.
Illuminating Engineering Society. National Technical Conference. Hotel Shoreham.

SEPTEMBER 16-19, 1951—DETROIT, MICHIGAN
American Public Works Association. Public Works Congress and Equipment Show.

SEPTEMBER 17-20, 1951—SAN FRANCISCO, CALIFORNIA
56th Annual Meeting, International Municipal Signal Association, Inc. Mark Hopkins Hotel.

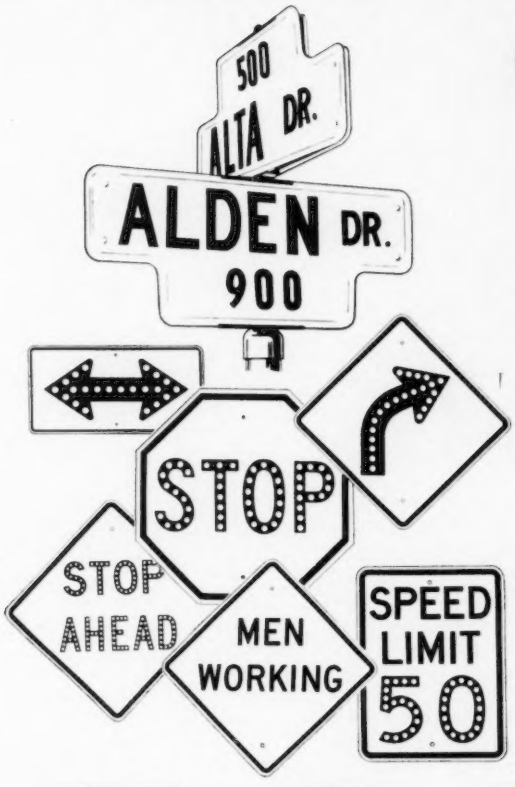
SEPTEMBER 24-27, 1951—LOS ANGELES, CALIFORNIA
Annual Meeting, Institute of Traffic Engineers. Ambassador Hotel.

OCTOBER 8-11, 1951—BOSTON, MASSACHUSETTS
American Association of Motor Vehicle Administrators. 19th Annual Conference. Copley Plaza Hotel.

OCTOBER 8-14, 1951—LIMA, PERU
Fifth Pan American Highway Congress.

TO EFFECTIVE

TRAFFIC CONTROL.....



Grote SIGNS

Here are high-visibility signs for practically every traffic control need; Street name plates for instant recognition of name and number; parking signs that politely enforce traffic control; road signs to improve highway safety. Built for years of dependable, long-wear service, all GROTE Signs are made of heavy, zinc coated, Bonderized steel, finished with special baked enamel processes that make them permanently bright and attractive — that resists the action of weather, salt spray, smoke or airborne chemicals. All are made to the Grote high standards of manufacture and conform to the accepted official standards and recommended uniform sign systems. For economy purchase and installation, always specify Grote Signs.

Send for our 1951 catalog of
Modern Signs for Modern Communities.

THE Grote MFG. CO., INC.
Grote Square
BELLEVUE, KENTUCKY
Opposite Cincinnati

New Appointments . . .

HUBERT A. (Mike) FLANAKIN, well known engineering faculty member at Louisiana State University, has been named Director of LSU Engineering Experiment Station.

In mapping out his program of work, he has carried out the idea of using the station as a coordinator for research work done by engineering faculty and experiment station personnel. Special studies in hydraulics, mechanical and

Rembrandt's Studio

chemical engineering will be placed under the direct supervision of the heads of those departments in the College of Engineering, he explained.

Before joining the LSU staff, Flanakin held a number of important engineering positions. He has served as bridge designer and as traffic and planning engineer in the State Department of Highways. He was state planning engineer with the State Department of Public Works from June, 1941, to July, 1942, when he became area director of the National Housing Agency. He remained in that position until January, 1943, when he joined the U. S. Army where he served as major and captain in the Transportation Corps. After returning to civilian life in January, 1946, he resumed his position with the National Housing Agency and remained at that post until August, 1947, when he joined the LSU faculty of the College of Engineering.

Flanakin has been active in many professional organizations.

He and Mrs. Flanakin have two daughters, Kendall Mab and Tara Duggan Flanakin.

ROY E. JORGENSEN received his B.S. in Civil Engineering at the University of California in 1930. After graduation, he obtained a position as Highway Engineer with the U. S. Bureau of Public Roads, in California, Washington, D. C., and Connecticut; he was with the U. S. Bureau for twelve years.

In 1942 he became Director of Highway Planning with the Connecticut State

Harris & Ewing

Highway Department and held this position for five years. He was promoted in 1947 to Deputy Commissioner and Chief Engineer and held this important post until February 1951.

Roy's part-time engagements included consultant work, in 1946, with the New Jersey State Highway Department, and he was a Research Associate at the Yale Bureau of Highway Traffic. He is a Registered Professional Engineer in the State of Connecticut and a member of several national societies. He is the author of many reports published by the Connecticut State Highway Department and technical papers which were presented at meetings of the Highway Research Board, American Society of Civil Engineers, American Association of State Highway Officials, and Institute of Traffic Engineers.

The Best Paper Award for 1949 was presented to him at a meeting of the Highway Research Board, National Research Council.

In his new position, as Engineering Counsel, Mr. Jorgensen will have charge of the National Highway Users Conference engineering activities and will serve in an advisory capacity to the national and state highway user groups on problems relating to development of highways, efficient highway use, and sound administrative practices for highway authorities. He will also be the N.H.U.C. liaison with the Bureau of Public Roads and the State Highway Officials. He and his wife, and two sons, now make their home in Washington, D. C.

BURTON H. SEXTON recently joined the staff of the Research and Planning Department as Traffic Engineer for the Capital Transit Company in Washington, D. C., filling the vacancy created by the recent resignation of J. Irving Knott (Assoc. Mem., ITE).

Mr. Sexton was formerly employed by the Indianapolis Railways where he was Assistant Director of Research and Schedules.

He is a graduate of Purdue University and was a Gordon-Cass Fellow at the Yale Bureau of Highway Traffic. He is married and has two children.

"PIGEONHOLE PARKING" is the name given to the type of parking that allows cars to be parked four deep, one above the other. A sliding hydraulic elevator lifts cars to their "pigeonholes" and returns them. A "pigeonhole" in Spokane, Washington, accommodates 142 cars compared to a lot capacity of 35. Los Angeles businessmen are expected to build 35 in that area.

MI-CO Parking Meters are Famous for:

1 SIMPLICITY
2 RUGGEDNESS
3 LOW MAINTENANCE
4 QUICK SERVICING
5 LONG LIFE
6 TOP EARNINGS

SEE REGULATIONS ON OTHER SIDE
INSERT ONE COIN AT A TIME
TURN HANDLE TO STOP AFTER EACH COIN
FREE PARKING ON SUNDAYS
MI-CO METER

Simplicity of design, sound engineering, and unusually rugged construction are inherent characteristics of MI-CO Parking Meters. By-products of such design and structural superiorities are:

UNUSUALLY LOW MAINTENANCE. This is assured because MI-CO's have fewer moving parts—on some models only six. A minimum of places for trouble to occur.

QUICK SERVICING—an important consideration because meters that are down for any length of time become a liability.

EXCEPTIONALLY LONG LIFE. The ability of MI-CO's to stand the "gaff" has repeatedly been proved in hundreds of installations, many of them five to ten years old. Plenty of MI-CO's have been in operation more than ten years, and reports indicate that they are still giving dependable, low-cost service.

TOP EARNINGS FOR MANY YEARS. You'll be interested in figures which show the consistently high earnings of MI-CO Meters year after year.

Here you have the reasons why MI-CO Parking Meters *outwork, outlive,* and *outearn* more expensive and more complicated types of meters. Compare the simplicity of a MI-CO with meters having complex mechanical mechanism—many of them so complicated they must be returned to the factory for adjustment. A big MI-CO advantage is that when one does need attention, the adjustment usually can be made in a few minutes right at the meter location. Very little time is lost, and costly repairs obviated.

All things considered, we believe your best buy in the parking meter field is MI-CO. We'll be glad to send you facts and figures which prove the dependability of these meters over long periods of time.

MI-CO METERS, 241 Court St., Covington, Ky.
Division of The Michaels Art Bronze Co., Inc.

1951 ITE Annual Meeting

September 24-27

Los Angeles, California

Ambassador Hotel

Make your plans *now* to attend this worthwhile and enjoyable affair.

Northwestern Summer Institute

Nine one-week courses and seminars for men and women whose everyday jobs have to do with the prevention of traffic accidents and congestion will be offered during the Summer Institute for Traffic Training June 18-July 27 at the Traffic Institute, Northwestern University, Evanston, Illinois. The Institute is conducted in cooperation with the National Committee for Traffic Training, a sub-committee of the National Committee for Traffic Safety.

The courses are for police administrators, school teachers, traffic engineers, safety council managers, motor fleet supervisors, persons who work with chemical tests and others in the traffic safety field.

The annual Summer Institute is planned to provide men and women who work in traffic safety with an opportunity to learn the latest methods in their particular fields, according to Franklin M. Kreml (Affil., ITE), Traffic Institute director. It is part of the Traffic Institute's plan to provide for the special training needs of persons in various professions working for the reduction of traffic accidents and congestion, he said.

These subjects will be covered during the six-week period: Chemical Tests to Determine Intoxication, Pedestrian Protection, Motor Fleet Supervision, School Bus Transportation, Driver Education for High School Teachers, Supervisory Police Officer Training, Public Education for Traffic Safety, Traffic Engineering, and Accident Records and Traffic Uses.

The course in traffic engineering will be conducted as a seminar and is scheduled for July 16-20. It is open to practicing traffic engineers, public works engineers, and engineering students specializing in traffic and transportation. A limited number of the principal problems of traffic engineering will be considered. George W. Barton (Mem., ITE), Evanston, Ill., who is consulting engineer to the Traffic Institute, will coordinate the seminar.

For further information on the course write to the Traffic Institute, Northwestern University, Evanston, Illinois.

Schools Use GM Film

More than 1,000 high schools now are using the newly introduced General Motors driver education film series. The thousandth film set recently was presented by Clyde Sargent (shown below), of Sargent Motors, North Arlington, New Jersey, left, to William Holbert, North Arlington school superintendent, center, while North Arlington Chief of Police John Eagan, right, smiles in approval. The series was produced by General Motors with the counsel of the National Commission on Safety Education of the National Education Association. It includes three motion and 12 slide films, covering all important points in automobile operation, and is nominally priced at $69.75.

MEMBERSHIP INFORMATION

may be obtained by writing to:
Executive Secretary
Institute of Traffic Engineers
Strathcona Hall
New Haven 11, Connecticut

Let's reflect a moment...
SAVE TIME & MONEY USING THE
Cataphote
BEADED SIGN KIT
Reflectorize and give extra life to your signs at ½ the usual cost. A brand new, extra low cost, easy-to-apply method of reflectorizing your signs. No special equipment, no special training. Virtually foolproof. Now you can reflectorize your own signs in your own shop. Write for full info and prices.
Cataphote
Corporation
TOLEDO 10, OHIO
Rush FREE descriptive pamphlet and full price list on CATAPHOTE Beaded Sign Kit and its low cost advantages to me:
Name
Title
City
State
MFRS. AGENTS INQUIRIES INVITED!

Professional Service Directory

GANNETT FLEMING CORDDRY and CARPENTER, INC.
---ENGINEERS---
CONSULTING SERVICES FOR TRAFFIC, PARKING and TRANSPORTATION PROBLEMS
City Planning — Highways — Bridges — Flood Control
Water Supply — Sewerage — Industrial Waste — Garbage Disposal
Appraisals — Investigations — Management
600 NO. 2nd STREET HARRISBURG, PA.
Pittsburgh, Pa. Scranton, Pa. Daytona Beach, Fla. Medellin, Colombia, S. A.

PARSONS, BRINCKERHOFF, HALL & MACDONALD
Engineers
Airports, Bridges, Tunnels, Highways, Traffic & Transportation Reports
Subways, Foundations, Harbor Works, Valuations, Power Developments, Industrial Buildings,
Dams, Sewerage, Water Supply
51 Broadway, New York 6, N. Y.

PALMER AND BAKER, INC.
CONSULTING ENGINEERS
For Problems of Transportation
Subaqueous Vehicular Tunnels Rock Tunnels Utility Tunnels Bridges
Grade Separations Highways Airports Traffic Studies
Parking Problems Waterfront and Harbor Structures
Complete Material, Chemical and Soils Laboratories
MOBILE, ALABAMA

JENKINS, MERCHANT & NANKIVIL
Consulting Engineers
Municipal Improvements Sewerage
Power Development Water Systems
Traffic Surveys Industrial Plants
Flood Control Recreational Facilities
Airports Investigations and Reports
805 East Miller Street
Springfield, Illinois

RAMP BUILDINGS CORPORATION
PLANNING CONSULTANT
SINCE 1920
PARKING & AUTOMOTIVE SERVICE FACILITIES
MUNICIPAL PROGRAMS PRIVATE PROJECTS
Surveys — Reports — Design — Economics — Finance — Appraisals
230 Park Avenue :: New York 17, N. Y.

DE LEUW, CATHER & COMPANY
CONSULTING ENGINEERS
Transportation, Public Transit and Traffic Problems
Subways, Railroads, Industrial Plants
Power Plants, Grade Separations,
Expressways, Tunnels, Municipal Works
150 N. Wacker Drive, Chicago 6, Ill.
79 McAllister St., San Francisco 2, Cal.

EDWARDS, KELCEY and BECK
CONSULTING ENGINEERS
Surveys — Reports — Economic Studies — Design — Supervision
Transportation — Traffic — Parking — Terminals — Port and Harbor Works
Highways — Expressways — Grade Separations — Tunnels
Bridges — Water Supply — Management
3 William Street, Newark 2, N. J. • 250 Park Avenue, New York 17, N. Y.

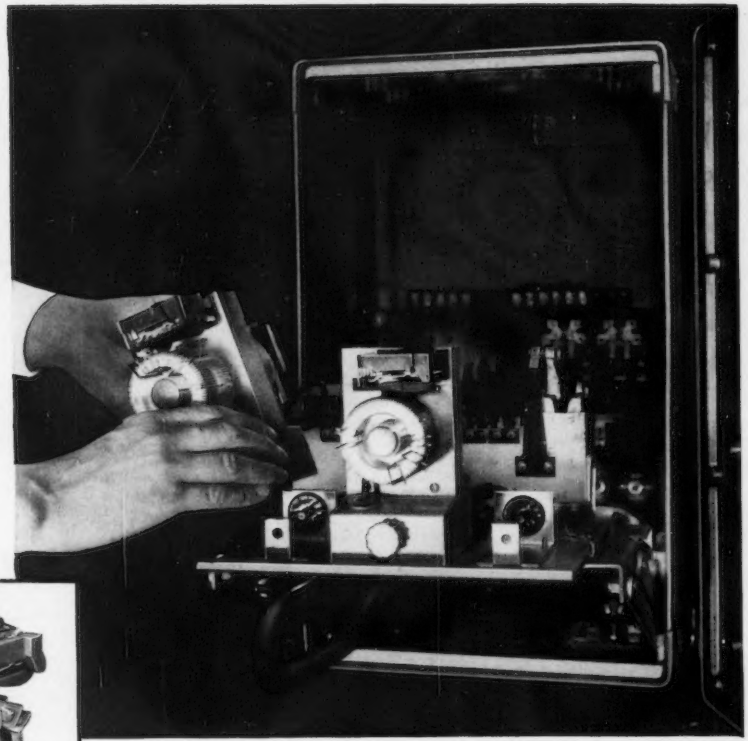
YOUR CARD
could be set in this space at a very reasonable rate.
If interested, please write:
TRAFFIC ENGINEERING
211 Strathcona Hall
New Haven 11, Connecticut

Index to Advertisers

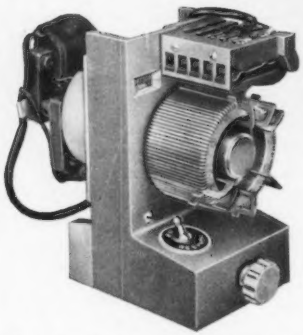
The revenue derived from the sale of advertising space assists the **Institute** in publishing TRAFFIC ENGINEERING on a regular monthly basis. The manufacturers listed below will be glad to cooperate with products and services which will be helpful to you in developing your traffic engineering and public improvement program.

AMERICAN GAS ACCUMULATOR CO. 289
AUTOMATIC SIGNAL COMPANY..... 319
CATAPHOTE CORPORATION..... 314 & 324
CROUSE-HINDS COMPANY..... 290
DUAL PARKING METER COMPANY..... 292
GENERAL ELECTRIC COMPANY.... 4th Cover
GROTE MANUFACTURING COMPANY.... 321
INDUSTRIAL ELECTRONICS..... 309
K-HILL SIGNAL COMPANY..... 309
KARPARK CORPORATION..... 308
MAGEE-HALE PARK-O-METER CO. ...2nd Cover
MI-CO METER COMPANY..... 323
MINNESOTA MINING & MFG. CO. 313
MIRO-FLEX COMPANY..... 317
PRISMO SAFETY CORPORATION..... 294
M. H. RHODES, INC. 315
TRAFFIC SAFETY SUPPLY COMPANY.... 314
TUTHILL SPRING COMPANY..... 314

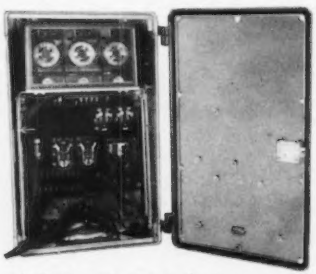
The Controller that grows with traffic!



You can convert a one-dial controller to two dials by just plugging in the second dial unit and its latch relay.



Each dial unit has its own synchronous motor, timing gear, dial contacts and timing keys.



Unitized construction is the key note of this new design controller—thus major parts can be readily replaced for servicing in a matter of minutes.

This is General Electric's new expansible controller. Buy it as a one-dial unit. Use it with or without interconnection. As traffic volume builds up or as conditions change just plug in a second dial unit—or a third. That's how easy it is to keep your traffic-control system growing with traffic!

This new traffic controller is a finer piece of equipment mechanically and electrically—as well as completely new in design. It greatly simplifies your planning and buying; it increases reliability and cuts maintenance. Let your nearest G-E Apparatus Sales Office or traffic control distributor show you how. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC